

RAILROAD GAZETTE

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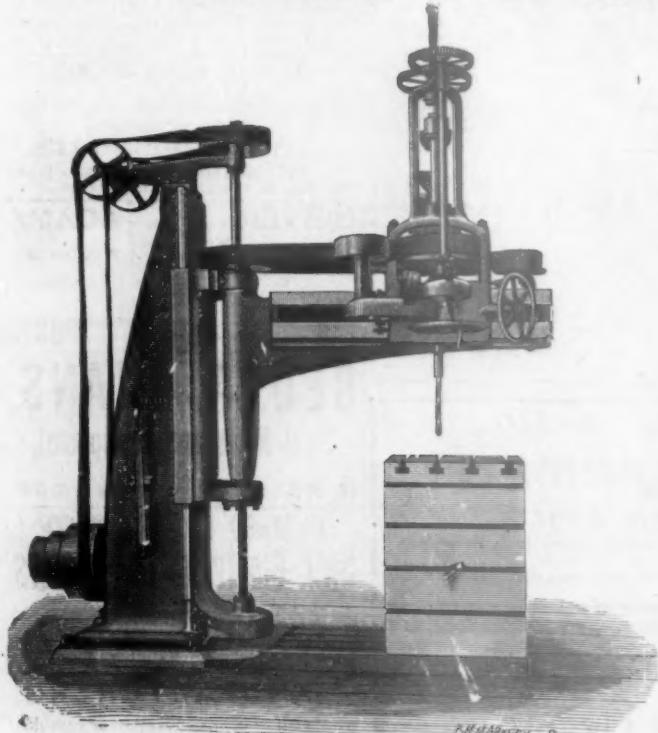
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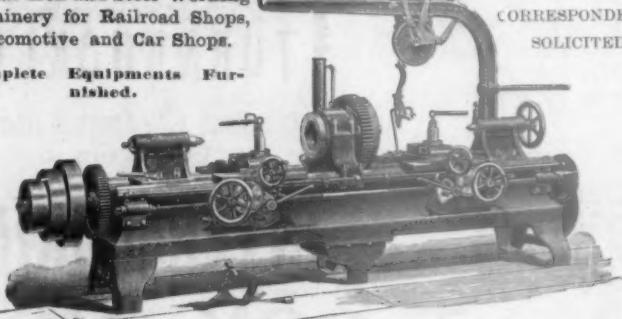
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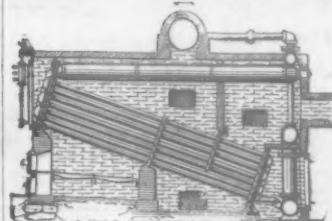
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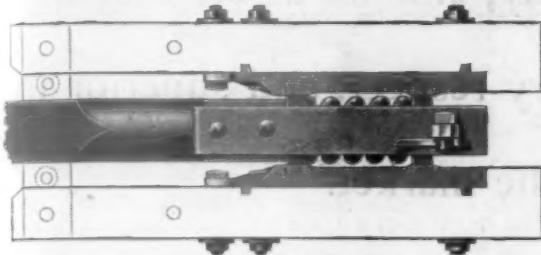
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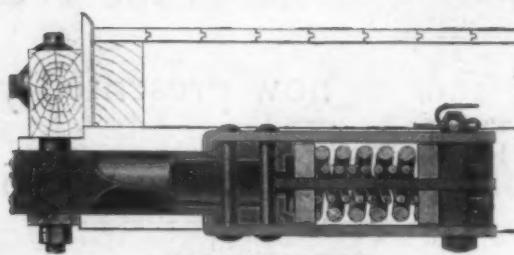
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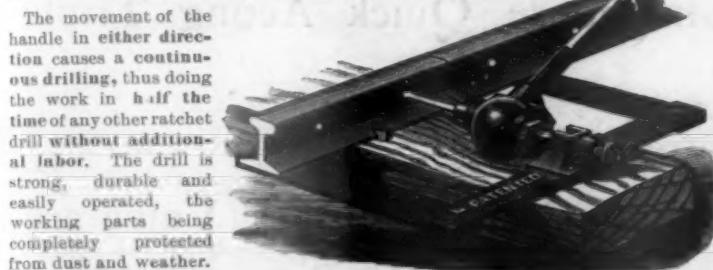
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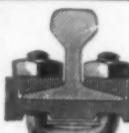
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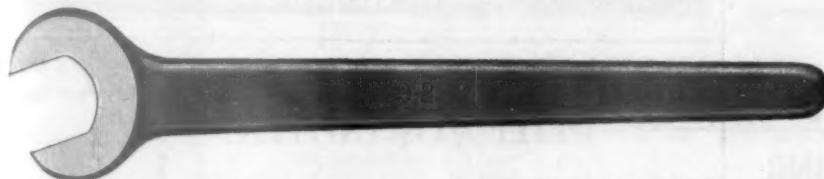


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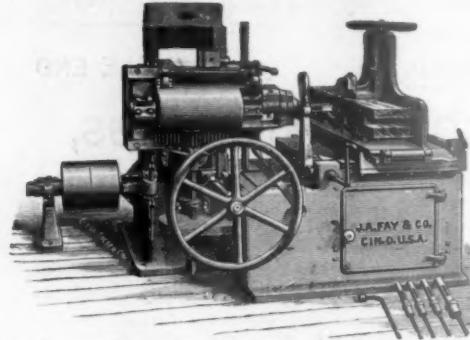
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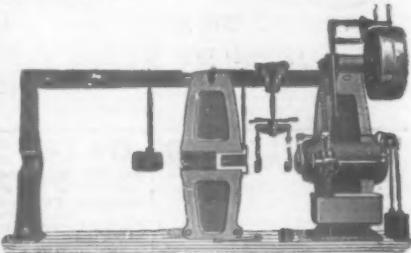
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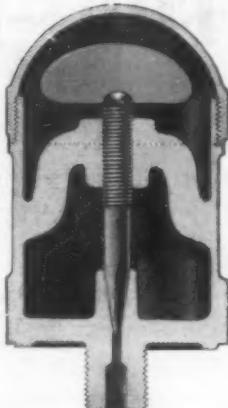
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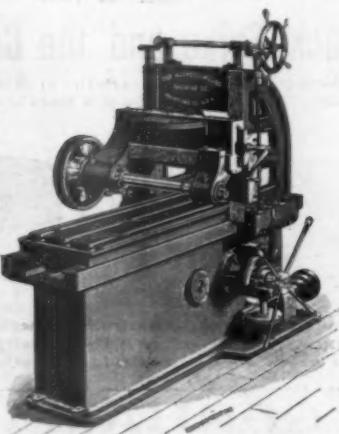
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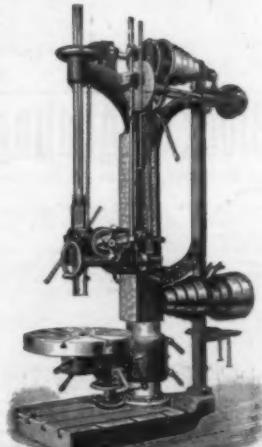
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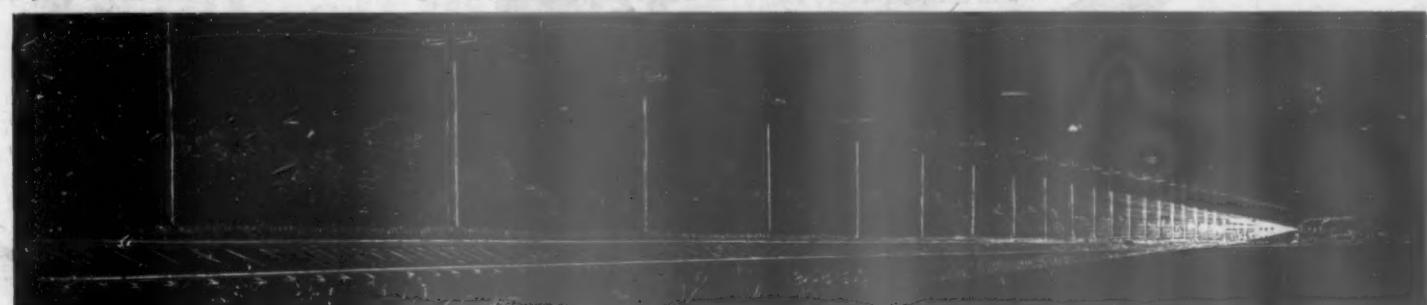
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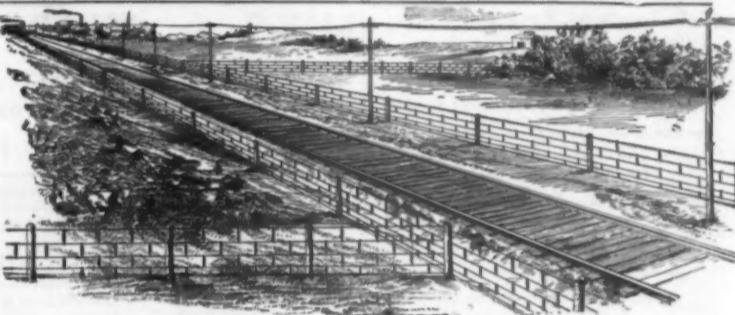
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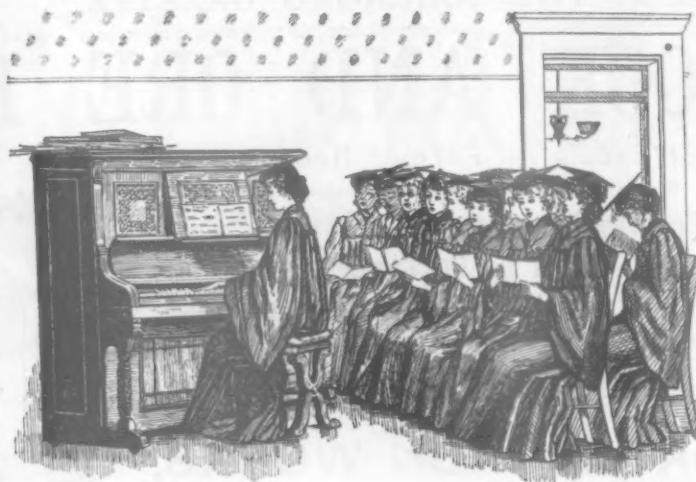
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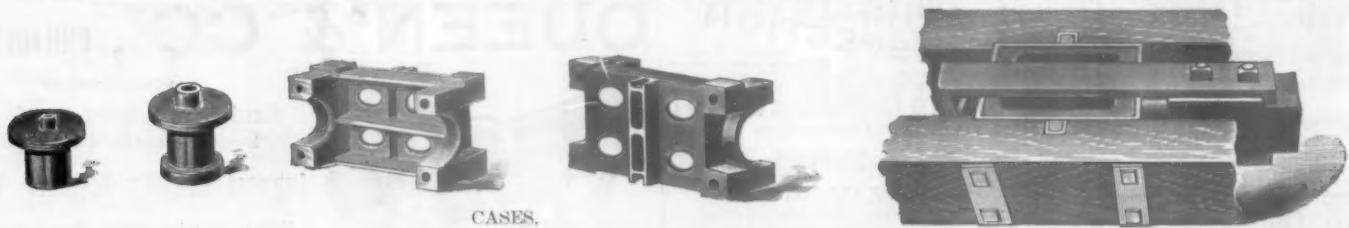
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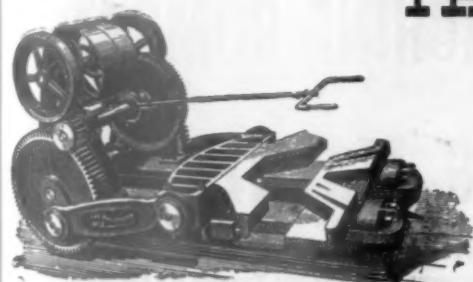
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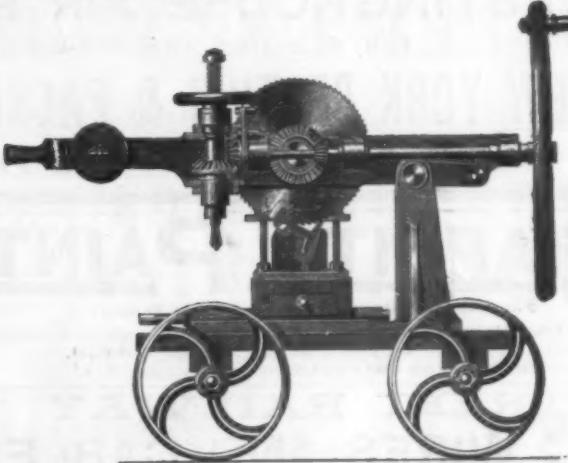


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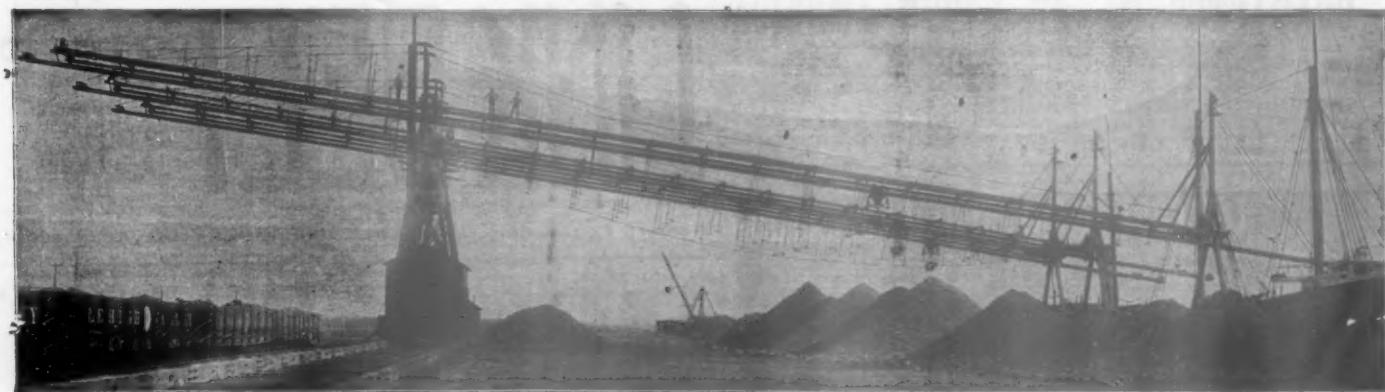
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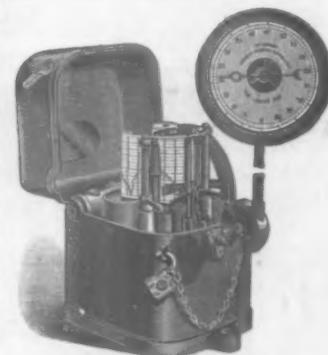
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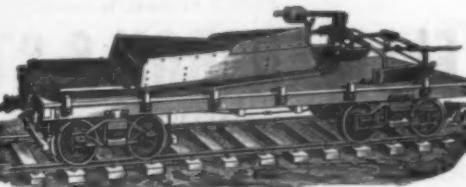
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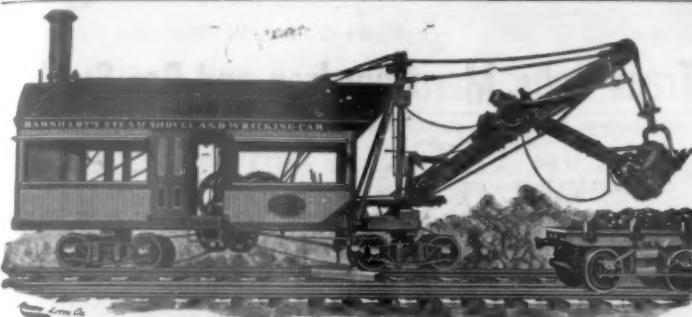
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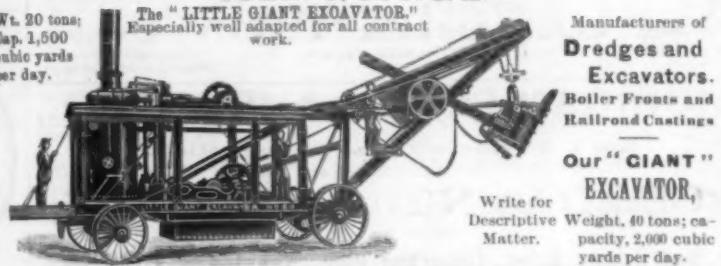
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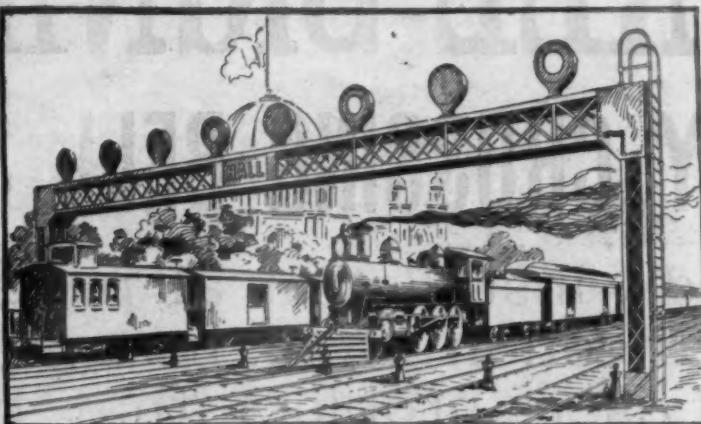
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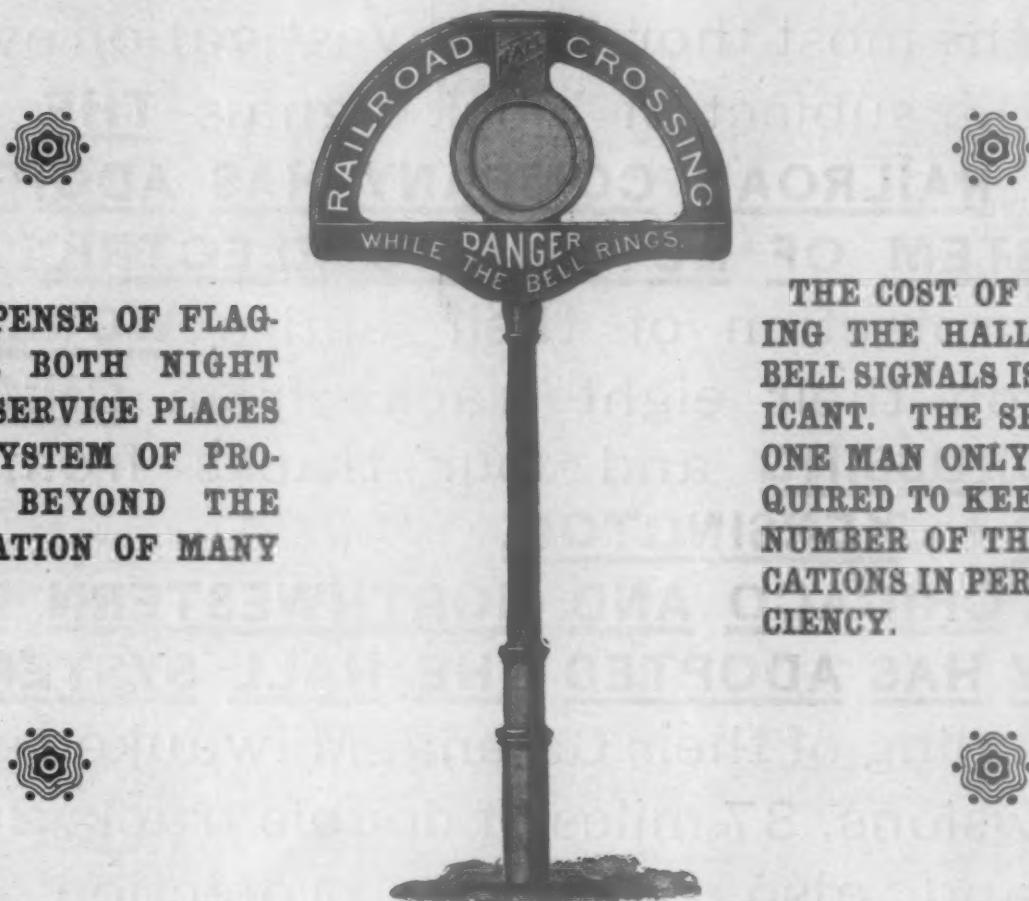
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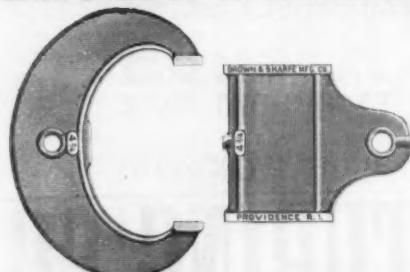
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FRIDAY, SEPT. 30.

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Contributions.

The New York and New Jersey Bridge.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Absence from town having prevented my revision of the proofs of the report on the Union Station of the New York and New Jersey Bridge, which appeared in your last issue, I wish to submit the following corrections:

1. The name of Charles B. Brush, Assistant Engineer New York & New Jersey Bridge Company, should be placed in conjunction with mine.

2. The grade of main tracks on the profile drawing should be changed to correspond with the report, 45 ft. per mile.

3. The preliminary statement, which appears to be a part of my report, is not so, in fact.

T. C. CLARKE.

The Servis Tie Plate and Spike Shearing.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue Sept. 23 there appears a communication from James Churchward concerning the Servis Tie Plate containing the following statement:

"In June, 1891, a curve of 10 deg. was laid on the Western New York & Pennsylvania Railroad at Rochester with the Servis plates and common spikes. Two or three days afterward a coal train sheared the head off every outside spike. I advised the Q & C Co. of this accident by letter, dated June 27, 1891. I believe that these two cases are all that is necessary to demonstrate the shearing or breaking of spikes with the Servis plate. If it is not I can supply more."

On the 27th day of June, 1891, Mr. Churchward did report such an accident to the Q & C Company, and after conference it was determined to have me go and investigate the matter fully. I arrived at Rochester July 1, 1891, and was assured by the officer of the line from whom the report was alleged to have come that no accident had ever occurred where the Servis Tie Plates had been used, and he was at a loss to know how such a report could have come to us.

Upon reading Mr. Churchward's letter as above I again appealed to the official of the Western New York & Pennsylvania as to the truth or falsehood of the statement and am in receipt of a communication stating that he never had a derailment of any kind whatever on this division where the Servis Tie Plate has been in use.

It is disagreeable to me to engage in controversies which tend to drag others into prominence, hence instead of inflicting the details and correspondence concerning this matter upon your readers, I herewith submit them for your examination as conclusive evidence that the statement above referred to is unqualifiedly false.

BENJAMIN REECE,
Engineer Q & C Company.

[We have seen the documents referred to in Mr. Reece's letter and are satisfied that the conclusions which he draws from them are just.—EDITOR RAILROAD GAZETTE.]

"Per Diem" Once More.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It will not be so very long before the American Railway Association will have its Fall meeting and with it an opportunity of adopting a per diem scheme for car service settlements. It is to be hoped that the members who believe in this principle have not lost their enthusiasm and that a discussion will be had on the subject. Only by full and continual discussion can this righteous reform be made a success. I am diffident about advising on such a complex subject, but I will venture a word in passing: I think a mistake was made in the American Railway Association in combining a per diem proposition with a reduction of rates to be paid for the use of private cars. The adoption of the plan embodied in the Car Service Committee's report would have seriously affected the revenues of many large shippers of quite a variety of commodities who are also car owners, and it is quite possible that their representatives in the railroads over which they ship—where it is quite possible that they have representatives—may have turned the day against per diem, when combined with the element which is naturally conservative, and the party that have unpleasant recollections of the per diem experiment of 1888.

It is really very curious to note that almost without an exception the men who know most about car service believe most in per diem. The car accountants are for per diem almost as a unit. The Car Service Committee of the American Railway Association—men who certainly were not selected because they were in favor of per diem, but who, since their selection have spent a great deal of time and thought on the question—are, with barely an exception, in favor of per diem, if we are to judge from the presence of their signatures on the reports of the Committee. In several instances, however, the companies which they represent have not come out in favor of the reports which they have signed.

So much has been said for per diem and so little against it in recent years that it is somewhat difficult to say anything new in its favor. I venture, however, to remind the owners of cars and their representatives that under the present system of accounting for car service a very large percentage of the cars which they own are in hands which may fairly be termed irresponsible for anything excepting for the delivery of cars at some indefinite time, either to the owners or some one else, in running order. This is all. If the delivery of a car is made at a point at which it was received there is usually no evidence, except in the office of the debtor road, that the car has run a mile or earned a cent. A car may remain with foreign road one day or three months. It may go back and forth between equally foreign roads any length of time, even years, and unless the junction report shows plainly that it has traveled over the railroad between different points there is no evidence, except in the office of the debtor road, that it has made any mileage. Further, there is absolutely no evidence when the mileage report comes in at the end of a month that any allowance has been made for the run of any particular car.

When we realize that many railroads have more than half their equipment in the hands of irresponsible parties, and when we further realize that the value of this equipment runs up into the millions of dollars, how shall we explain the fact that the sharp business men, who compose the boards of directors of American railroads, can allow the use of such vast amounts of property in such an absolutely irresponsible way?

It is true that every railroad whose cars are thus handled is itself handling the cars of other railroads in the same manner, but it must be a poor consolation to the owners of cars, as they consider what vast sums they may be losing through the carelessness of other railroads, to reflect that they themselves may be getting square, in a way, by their careless usage of an equal number of some one else's cars.

The fact that each railroad has a car service department which spends a large proportion of its time in tracing, telegraphing and corresponding, with the object of getting its own cars home does not alter the state of affairs in the least. There is hardly a station in this country where the agent will not load a foreign car out of route if he cannot readily get a home car for the shipment. On some railroads agents demur before loading such cars to a connecting railroad away from home because such action will be shown on the junction card and may bring out a strong protest. There is no one to protest, however, if a car is loaded out of route so long as it does not go beyond the borders of the loading railroad; and unless the owners of the car have exceptionally active lost-car men, there is no evidence of such misuse except, as above noted, in the office of the debtor road.

The railroads of this country have, in fact, if not in theory, got about as near pooling equipment as they can get; but their system of settling for the use of cars has not kept up with the times. I do not believe that any of the schemes for exacting a penalty for the diversion of cars will ever be adopted or ever be enforced. When an agent diverts a car, and when his superior winks at it, it is an acknowledgment, perhaps unconscious, of the desirability, if not the necessity, of pooling freight cars. I do not know but that the business of the country as a whole is done better and more cheaply because freight cars are misused, that is, pooled; but this pooling is done in a very haphazard way, and the rights of the owners of the cars receive no real consideration whatever. The

only rational as well as the simplest solution is the adoption of a per diem system; that is, a plan which will insure to the owner of a car a definite compensation for every day of its existence.

S. B. S.

Master Car & Locomotive Painters' Association.

The twenty-third annual convention of this association was held at Detroit, Mich., on Sept. 14, 15 and 16.

The meeting was opened at 10 o'clock a.m. on Wednesday, with a few words of welcome from President J. A. Gohen. He introduced Mr. J. B. Corliss, who had been delegated by the Mayor of the city to deliver the address of welcome.

Ninety-two active members were in attendance, seventeen of whom were new members. The annual report of the secretary and treasurer was read, showing 27 new members, making the total active membership 136.

The receipts of the Treasury had been \$308, which with a balance on hand at last report of \$80, gave a total on hand and received of \$388. The disbursements for the year were \$277, leaving a balance in treasury of \$111.

The Executive Committee reported that a circular letter had been sent to railroad managers setting forth the objects of the Association and asking recognition in the matter of procuring transportation for the members to the annual conventions. The letter had been responded to by a number of railroad managers and by the Master Car Builders' Association, promising to aid the organization in their efforts to make the Master Car and Locomotive Painters' Association a success in perfecting their art. The election of officers for the ensuing year resulted in the choice of the following: President, W. O. Quest (Pittsburgh and Lake Erie, Pittsburgh, Pa.); First Vice-President, W. J. Orr (Buffalo Rochester & Pittsburgh), Rochester, N.Y.; Second Vice-President, W. T. Leopold (Central of Georgia, Savannah, Ga.); Secretary and Treasurer, Robt. McKeon New York, Lake Erie & Western, Kent, Ohio. Mr. McKeon was re-elected for the nineteenth year.

The subjects reported on by the several committees and discussed were of more than usual interest. The first was, "Would it be practicable for railroad companies to adopt the piece price system in the paint department?" E. L. Bigelow (Baltimore & Ohio), J. M. P. Stroud (Allegheny Valley), and J. W. Houser (Cumberland Valley), presented reports, speaking favorably of the system and recommending that it be generally adopted, as it was working with the best of results on their roads. Five hours was taken up in a general discussion of the plan. A large majority of the members had practiced it and did not see why it was not practicable in all shops and on repair work as well as on new equipment. Even where only a dozen men were employed it had worked satisfactorily, proved economical to the companies and gave the employés better wages than by day work. A number of shops had been working on the plan for several years. The workmen were well pleased and preferred to lie off rather than do day work, which sometimes became necessary because it was difficult for the foreman to put a price on some particular work. A resolution was passed that it was practical and profitable to adopt this system in all shops, no matter how small the number of men employed. However, it was admitted that locality and circumstances might not be favorable to its success in all cases.

The next subject was: "What is the best method of making putty for passenger car work? and is it advisable to use any coloring with lead in mixing hard drying putty?" The committee on this question was J. H. Bannon (Lehigh Valley), B. F. Murphy (Wilmington & Weldon), and Wm. Cleonan (Lewis & Fowler Manufacturing Co.). Reports were read which gave the cause of unsatisfactory results. Unseasoned lumber, which caused putty to swell, was one. The swelling and loosening from the nail hole is caused by the shrinkage of the wood and the putty is pushed out by the nail, which on battens may often be seen level with the surface of the wood; the nails also break between the soft and hard wood and the nail works out. Good coach putty should be made principally with dry white lead and varnish, using japan gold size as a dryer; it must be well hammered and used as stiff as possible. Coloring the putty is not necessary nor is it any benefit to the putty, as all coloring matter retards drying and hardening.

The third question was, "In what manner should the outside surface of a passenger car be treated that has a good foundation, but requires re-coloring; should the varnish be removed; if so, how?" J. H. Stout (Baltimore & Ohio), H. G. Taylor (Pittsburgh & Western) and Robt. Shore (Lake Shore & Michigan Southern), as the committee, presented a report which was followed by discussion. The re-coloring of a car should be done by first removing the varnish, although it was seldom that any great amount was left on the car when it was found necessary to re-color and varnish it. A solution of soda followed by sand papering was considered best for cutting down and removing the old dead varnish, when it must be washed thoroughly to remove the alkali.

Subject No. 4 was, "What can be done by the members of this Association to make it of greater benefit to master painters and to the companies they represent." Mr. J. A. Gohen (Chesapeake & Ohio) read a paper which was fully indorsed by the meeting.

Subject No. 5 was the question of a Standing Arbitration Committee. The committee, A. J. Benning (Louis-

ville & Nashville), A. J. Bishop (Cleveland, Cincinnati, Chicago & St. Louis) and Eugene Laing (Northern Central) presented their report, but did not entirely favor the establishment of such a committee. It would be meddling with that which belongs to the Master Car Builders. If a committee was desired to arbitrate on inferior painting done by other roads or by parties furnishing new rolling stock, a Master Car Builder could ask the executive board of the association to inspect the work with his foreman painter. After some discussion it was agreed that it would be unwise to appoint a standing committee unless requested by superiors. The subject was laid over to be taken up at the next convention.

The sixth subject was, "Requisitions for material in the paint shop." This was reported on by Mr. J. Orr (Buffalo, Rochester & Pittsburgh), T. M. Dunlop (Baltimore & Ohio), and Warner Bailey (Concord). Many good suggestions were brought out. A 60-days' supply only should be ordered of paints and tools, but it was economy to order varnish in large lots, as age improves it. Many shops have always one year's supply ahead.

The seventh question was, "Which are the most durable, light or dark colors on passenger car bodies?" which is the least expensive to maintain, yellow, Pullman color or Tuscan red? The committee (Thomas Byrne (Chesapeake & Ohio), John A. Rutz (Wisconsin Central), and C. M. Lang (Old Colony), evinced some difference of opinion. No decision was reached, and the subject was referred to a committee of five, consisting of W. Stines, Jos. Murphy, Eugene Laing, J. H. Baldwin and F. S. Ball, who reported later that Pullman color was the least expensive, it being more easily cleaned up and easier to match when preparing to revarnish. It did not show stains in the color as readily as yellow or Tuscan red. A vote was taken on the report, which resulted in its acceptance as expressing the views of the members generally.

Question No. 8 was: "Are passenger cars receiving proper care at terminals?" The committee was W. T. Leopold (Central of Georgia) and Wm. O. Quest (Pittsburgh & Lake Erie). Many good suggestions as to the care of cars were given, but it was a plain fact that most roads do not give passenger coaches proper attention after putting them in service. While a number of roads give the foreman painter full control of the cleaning of coaches, others are paying but little attention to it and dirty cars both inside and outside are in the majority. Good painting is ruined by inexperienced cleaners. It was recommended that more cleaning and greater care be given to coaches after leaving the paint shop. If this was carried out the cars would not have to be returned to the shop for cleaning and revarnishing as often as they now are. What is expended in cleaning may be saved in painting and the passenger equipment be kept looking fresh and clean at all times.

Mr. Gohm (Chesapeake & Ohio) stated that without exception his road had the cleanest cars in the country, as a result of cleaning regularly at terminal points. These cars are a straw color. The officers of the road complained at first of the cleaning expenses, but after years of trial they are now fully convinced that it is the best of economy and they point with pride at their clean passenger cars. The cleaning is done under the supervision of the master painter at all terminal points. It was stated that if roads, in place of advertising through cars without change would announce fresh and clean coaches every 200 miles it would draw travel to their line.

Question 9 was, What is the difference in cost of painting a passenger car with yellow, Pullman color or Tuscan red? Louis Fox (New York Central) and J. G. Keil (Chicago & Alton) made short reports. The difference in cost was principally in the finishing color coats, yellow being the most expensive, as it required four or five coats, where Pullman or Tuscan could be finished with two coats. There was a saving of both labor and material in the dark colors, but the Pullman color was the cheapest. The report of the committee was on motion received as information and no discussion was had.

The list of "queries" which follows was introduced for the purpose of learning methods employed and comparing one with another. We summarize the answers under each.

1. Do you paint your engine frames with color and then varnish them or do you use asphaltum? It was ascertained that a coat of asphaltum or black varnish was generally used, varnishing being an unnecessary expense on the frame.

2. How do you clean paint and varnish from glass? Generally with fine pumice stone and water, after scraping the paint from the edges of the glass in the sash, but it is better not to get any paint on the glass; care should be exercised in painting sash.

3. In touching up and revarnishing a coach is it economy to thoroughly clean and touch up the deck and trucks or to paint them over? It was not considered economical to clean and varnish. A rough washing was all that was required, and it was cheaper to paint deck and trucks as well as steps and platform when the car came in for revarnishing.

4. How do you use gold and copper bronze for seat arms, heater pipes, etc.; dry or mixed? Almost every member used bronze mixed. Some were using a liquid bronze that was far superior to that mixed in the shop in that it did not tarnish but retained its rich color.

5. Which is the best gilding size, slow or quick? A

size which dried ready for gilding in from two to three hours was the best.

6. In cutting in a coach with color do you use it mixed in the same way as when giving a general painting? This question, being important, was referred to the Advisory Committee to be placed on the list of subjects for the next convention.

7. Do you give the sash the last coat of varnish before or after they are put in? In finishing coach sash it was the general plan to give the last coat of varnish before putting in.

8. Has any member ever found a paint remover that he felt sure would not injure the wood or subsequent painting? None had been found to give the results desired, and the only paint remover was fire, by burning off either with the gas jet or an automatic torch.

The list of subjects on the programme being completed, the usual committees were appointed and a number of subjects approved of for the next convention. Resolutions on the death of Joseph Glass, Jr., late Master Painter of the Lake Shore & Michigan Southern at Adrian, Mich., which occurred April 9 last, were passed. After a three days' session the Convention adjourned at 10 o'clock Friday evening, to meet in Milwaukee in September, 1893.

New Passenger Station at Broad Street, Philadelphia.

We print on the opposite page three diagrams which will give some idea of the improvements which have been begun at the main passenger station of the Pennsylvania Railroad in Philadelphia, which, as our readers know from previous announcements in the *Railroad Gazette*, are quite extensive. This station which, since its erection 11 years ago, has been one of the most prominent railroad terminals in the country, occupies about half the space shown on the accompanying plans. The present head-house occupies the northern portion of the space shown in the plan of the new one. The reconstruction includes a new trainshed, of one large span, about 307 x 610 ft., to cover all the 18 tracks, and the practical rebuilding of the existing head-house in every part except the main walls. The present trainshed is divided into two spans. The enlarged head-house will be about 120 x 305 ft.

Fig. 1 shows the arrangement of tracks. In general this is the same as that now existing, except that it is enlarged; and the freight houses of the railroad company and of the Adams Express Company will be further west than now. It will be understood that all the main and side tracks rest on masonry above the streets. Fifteenth street passes under the lobby of the passenger station and affords an approach on the back side of the ground floor. This is to be used chiefly by carriages and baggage wagons. A new signal tower will be erected on the north or Filbert street side of the yard between seventeenth and eighteen streets. This will probably be 20 x 50 ft. in size. The arrangement of crossover and ladder tracks needs no explanation. It will be seen that two trains can enter the station simultaneously with a choice of several platform tracks for each, and that two trains can depart simultaneously. There is only one main outbound track, however, it being deemed unnecessary to provide for the departure of more than one loaded and one empty train at the same time.

Fig. 2 shows the main floor (the second or track-level floor) of the head-house, with a general waiting-room 82 x 118½ ft. The women's room is also very large and the other appointments are in proportion, the dining-room being 29 x 117 ft. In connection with the elevators for baggage and mail bags, which are in the southwest corner, close to the train shed, there are commodious rooms, for handling the goods, on the ground floor as well as on the floor shown in this engraving.

Fig. 3 shows the ground floor, the arrangement of which is self-explanatory. The general plan of the existing station is retained; that is, the conveniences for departing passengers, the ticket office, baggage rooms, etc., are on the ground floor. The main change effected by the enlargement of this floor is the provision of very much larger space for the lobby and for carriages. The main entrance at the southeast corner will be an imposing feature of the building, and the general architectural design of the exterior of the existing building is to be followed in the new structure. The new building will be 14 stories high and will be used for offices for the railroad.

Boiler Scale and Purification of Feed-Water.

Nearly all natural waters contain more or less of these scale-forming elements, being not only held in solution, but suspension also. The amount of mineral matter held in solution by water ordinarily supplied for boiler purposes varies from 10 to 150 grains per gallon, and in some localities even more than this has been found. But a much less quantity than the latter is sufficient to cause trouble and expense.

It has been stated that as much as 1,300 lbs. of incrustation have been taken from a single boiler at one time. It would seem as though it were almost impossible for so large a quantity of earthy matter to be deposited from waters which average only 17 grains per gallon. When we come to think, however, of the vast quantities of water that pass into a locomotive boiler, in some instances about 45 gallons per mile, we would have, if we

Read before the New York Railroad Club at a regular monthly meeting Sept. 15, 1892, by Mr. F. A. Stinar.

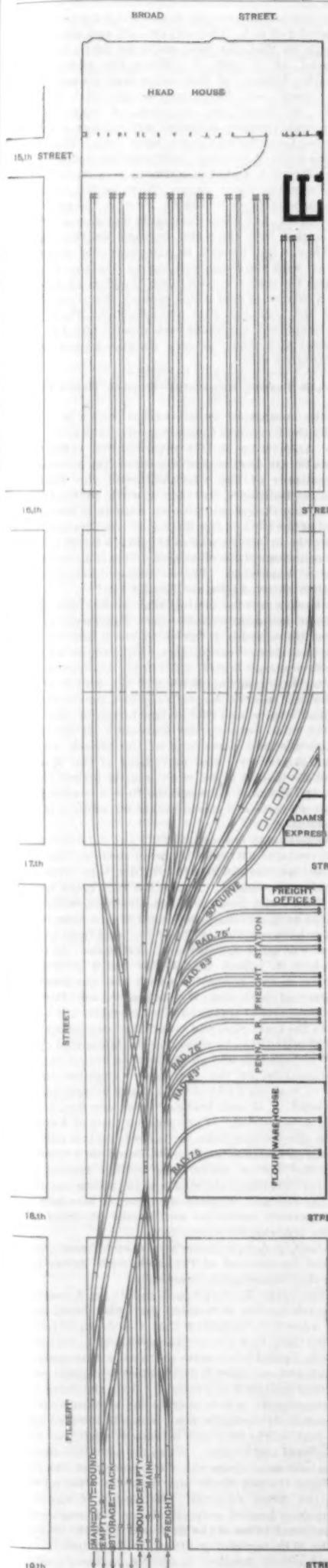
accept the above statement, on an average of 765 grains, or more than an ounce and a half of earthy matter which enters the boiler per mile; multiply this by 4,500, the average number of miles run by a locomotive per month, at the present time, we would have a little over 421 lbs. of incrustating matter entering the boiler in one month, or over 5,000 lbs. per year. This amount of solid matter is sufficient to cover 400 sq. ft. of surface $\frac{1}{4}$ of an inch thick. Nor is this the maximum; some locomotives take water from water-stations that furnish water that is much below this average in purity.

The effect of such incrustations or deposits are detrimental, and add largely to the running expenses both for fuel and repairs, as well as great risk of explosions, and shortening not only the life of the flues but the boiler as well. There is no doubt but what a coating of scale increases very much the difficulty of heating the water. Scale, whether hard or crystalline, or deposits soft and slushy, are very poor conductors of heat, being relatively as to iron as one to 32, so that $\frac{1}{2}$ of an inch of scale is almost equivalent to an inch of iron interposed between the heat of the fire and the water. Various estimates have been made as to the proportionate loss in fuel from scale. It has been generally accepted that $\frac{1}{4}$ of an inch of scale causes a loss of 28 per cent., $\frac{1}{2}$ of an inch 60 per cent., and $\frac{3}{4}$ an inch about 150 per cent., or 2½ times the fuel required if the boiler was clean.

As to repairs, when a boiler is coated with scale the heat conducting power between the fire and water is in a proportion rapidly decreasing with each successive film of scale on the iron, so that in order to raise steam to 90 lbs. pressure, corresponding to a temperature of 320 deg. Fahrenheit in a boiler with $\frac{1}{2}$ -in. iron in which there is a layer of scale or deposit $\frac{1}{2}$ an inch thick, it would be necessary to impart about 800 deg. of heat to the iron, whereas if the iron was clean, 325 deg. of heat would produce 320 deg. in the water. Iron heated to 800 deg., which is equivalent to dull redness, is very weak and is just in condition when bulges and cracks occur, and if nothing more happens, immediate repairs are necessary. A properly designed and well-constructed boiler, when equal to the work required of it and intelligently cared for should last in good condition from 15 to 20 years; but how many boilers are there that continue in good condition for even five years. In most cases the depreciation of boilers is caused from the giving out of the fire-sheets until they have been patched past redemption. This trouble with firebox sheets is entirely owing to deposits of sediments and scale, which, although most effecting to the fire-sheets, weaken the whole boiler. A much patched boiler is positive indication that it has suffered from undue and unequal expansion and contraction.

Among the various contrivances in use at various times, to prevent the accumulation of these deposits and incrustations, those most generally used were mud-drums, bottom and surface blow-offs, heating the feed-water, chemical compounds, and filtration or purification of the water before entering the boiler. In some cases some of these would result beneficially, especially the last, and it would seem as though the purifying the water of these scale-forming elements before it is used was the better and more common sense way of solving this question, and thereby save a large amount of subsequent expense for labor and repairs, and not only that, it would insure a longer lease of life to the boiler. The mud-drum is in no sense an extractor of either mud or sediment; the position it generally occupies makes it impossible that its contents should ever become sufficiently heated to effect a separation of the salts held in solution. It may collect matter held in suspension, where muddy feed-water is used, but a simple filter would be more effective. The objection to surface blow-offs is that, in order to be effectual, their use must be frequent, thereby wasting water already heated, and at the same time increasing the duties of the engineer and fireman, which leads to a gradual neglect of the means at hand. Feed-water heaters are frequently called "lime-catchers," but the justice of that claim is questionable. In order to effect a complete separation of the salts in solution the water must be heated considerably above the boiling point, and, in addition, time and quiet must be given for precipitation to take place, so that even in heaters, which heat feed-water to the boiling point, only a small proportion of the lime can be extracted, owing to agitation in the heaters from the currents and the lightness of the carbonates of lime which need considerable time for precipitation. Feed-water heaters are, no doubt, beneficial and good results in the saving of fuel are obtained. Chemical compounds variously known as anti-incrustants and lime extractors act variously according to their composition when put into a boiler. But they in no case extract or remove sediment or deposits from a boiler. The most that can be said of them is that they rot or loosen old scale in the boilers so that it can be easily removed by the hand or by converting the sulphate of lime or other hard incrusting elements into a slushy condition so that they can readily be removed by washing out.

And right here the question arises: Is this sediment or deposit, when in a soft or slushy state, injurious to the boilers? The larger portion of this slushy deposit is carbonate of lime, and which, on account of its lightness, is long held in suspension. When a large amount of water is evaporated in a boiler and very little blowing off is done, the water becomes saturated with the carbonates and obstructs the free escape of steam-bubbles

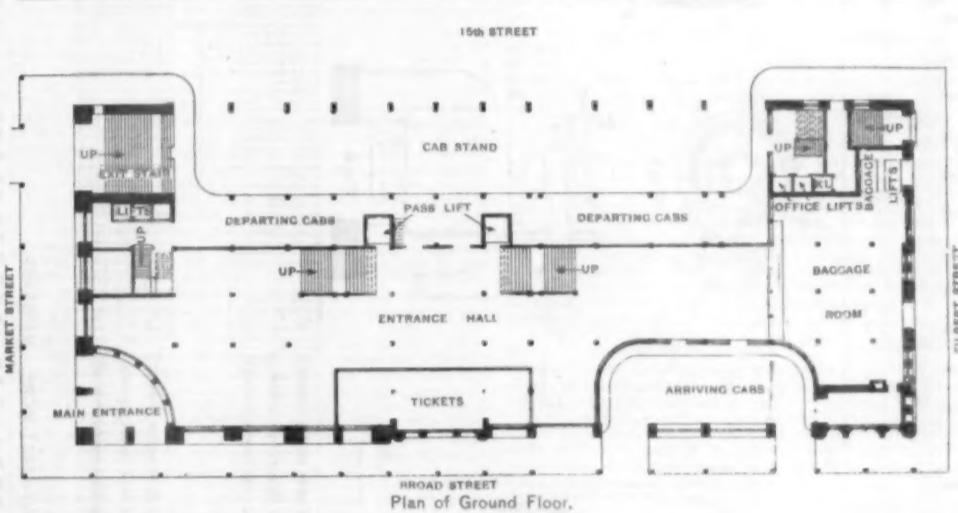
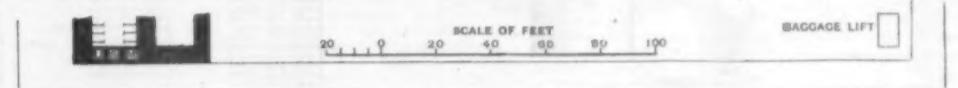


PLAN OF TRACKS IN THE ENLARGED TRAIN SHED AND YARD OF THE PENNSYLVANIA RAILROAD AT BROAD STREET STATION, PHILADELPHIA.

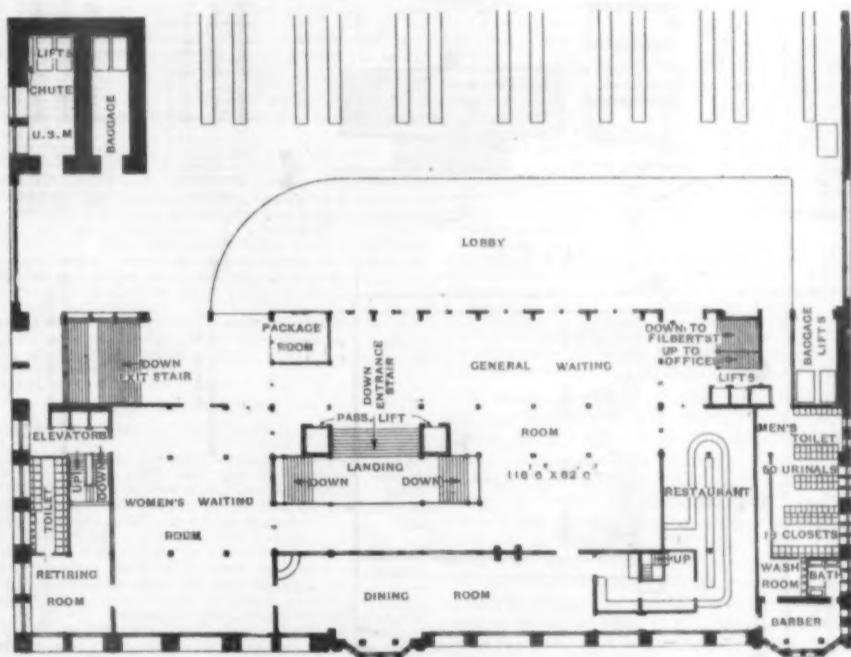
and necessitates the expenditure of a large amount of money annually for labor and extra fuel. In some localities boilers are washed out two and three times a week, and in some sections of the country the boiler water has to be changed each trip of 150 miles.

Taking all the foregoing into consideration it would seem that instead of pumping water into a boiler that is impregnated with these scale-forming elements and lighting them in the boiler if we would purify the water of these incrusting solids before it is taken into the boiler we would be taking a step in the right direction, and our boilers would last longer. Now the question arises, Can this be done economically and effectively? For answer we would say that in 1844 the late Dr. Clark, of Aberdeen, Scotland, brought out his process by adding just sufficient slaked lime to the water to combine with

pipe and check-valve partially closed, and the charged water is gradually carried into a large water-tank. In the water tank the feed pipe discharges the water through an elbow, delivering the water horizontally, close to the side of the tank, about one quarter the depth from the bottom, imparting to it a whirling motion, whereby the precipitate or sediment is gradually deposited at the centre of the floor of the tank, the clean water rising to the surface, and the water drawn off for use, by a suitable device. A valve is placed in the centre of the bottom of the tank, or as near the centre as possible, from which a waste pipe leads away to the nearest ditch. This is opened from time to time, and enough of water is run off to carry away the constantly accumulating sediment. It is needless to dilate on the advantages to be derived by the purification of boiler-water before it is



Plan of Ground Floor.



Plan of Second Floor (Track Level).

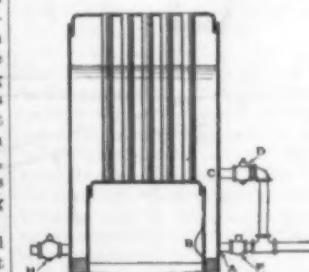
NEW PASSENGER STATION AT BROAD STREET, PHILADELPHIA—PENNSYLVANIA RAILROAD.

the free carbonic acid, and thereby causing all these carbonates to precipitate at normal temperature. By using this process in a suitable plant we can dispose of these salts and get the water clear of them at normal temperature, and flush away the sediment as it accumulates. By a suitable plant, we mean a device by which the requisite amount of chemicals is carried into the water-tank with the water, or in other words, regulating the supply of chemicals to suit the requirements as found by an analysis of the water. We would say that a plant of this kind, using the above process, has been in use on the Union Pacific Railway for the past year, giving satisfactory results, so much so that other plants are being put in at other points, the company feeling satisfied that a large saving can be effected.

A description of this plant is as follows: A small closed tank of boiler-iron is placed in some convenient location, by the side of the feed or water supply pipe, with an inlet pipe from and a discharge pipe into the feed pipe on either side of a check-valve; by partially closing which a portion of the water is compelled to pass through the closed or chemical tank. The gate-valve is then closed, the inlet and outlet valves opened, the feed-

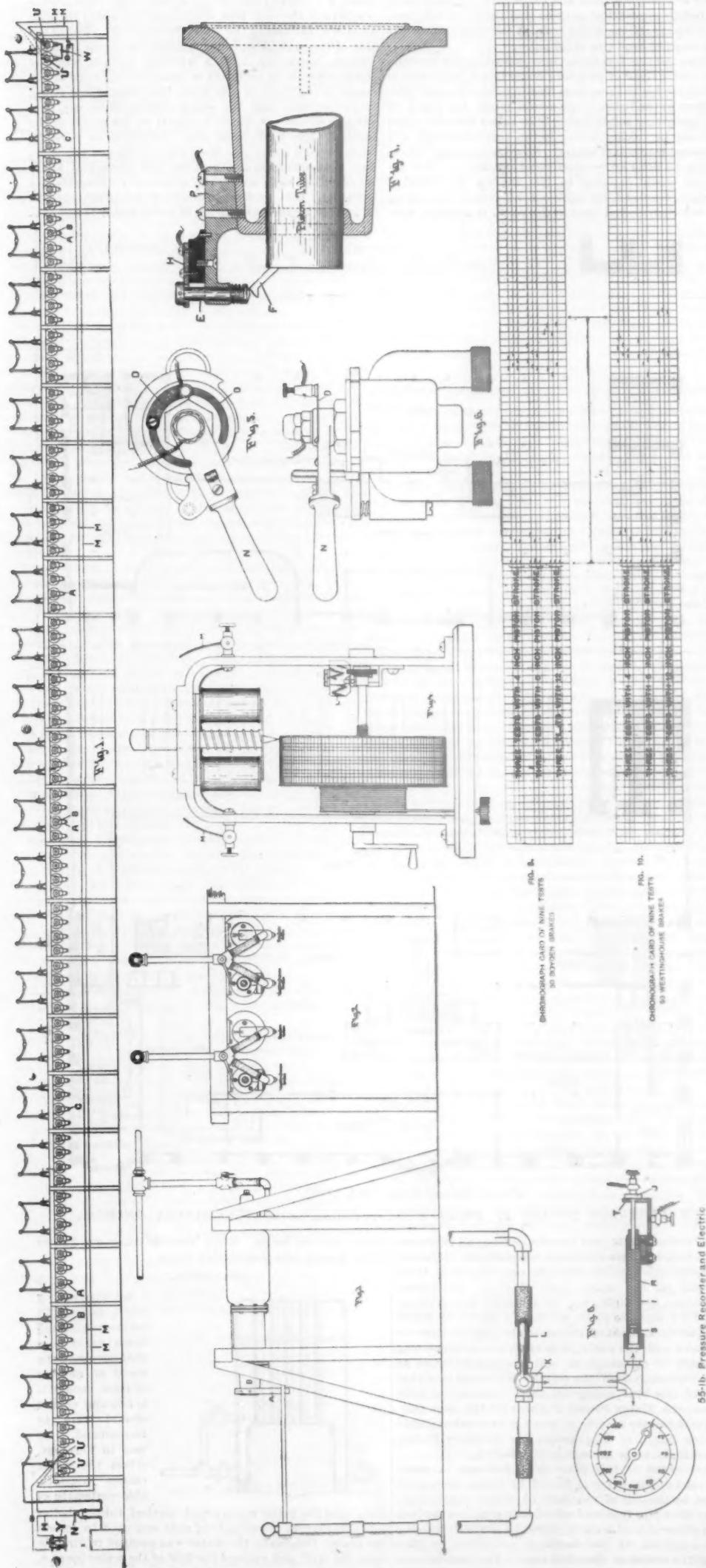
taken into the boiler. Every railroad manager knows to his sorrow what boiler-scale costs.

DISCUSSION.



Mr. FOWLER: I saw a method of boiler cleaning some years ago that possessed the merit of novelty at least, though it is not one that I should care to recommend. It was in Vermont, where the water carries considerable carbonate of lime, and the boiler was a small, vertical, tubular boiler like this sketch. Carbonate of soda was used to loosen the scale. Originally the water was pumped in directly from the well, and entered the foot of the water leg at *a*. But as the temperature of the water was from 45 deg.

and not only that, but they obstruct the free action of the heat and the water. This sediment or slushy matter will settle around the seams, and in locomotive boilers around the furnace sides and water-legs, thereby causing leakage at those points and fracture to the stay-sheets, bolts and rivets, shortening the life of the flues



to 50 deg. summer and winter, it was not long before a blister developed at *b*. They cut this off, and ran up a branch pipe so that the feed could be taken in at *c* with cocks at *d* and *e*. When the pump was running the bottom of this boiler was always cold, so that there was no place about the firebox for scale to burn on; in fact, I have seen seventy pounds pressure indicated in the gauge, and the leg sweating from the cold at the same time. The men were in the habit of drawing their washing water from the blow-off cock *h*, and then warming it up by blowing in steam from the water gauge. Now, as Mr. Stinar said, the carbonates were floating about in the agitated water at the top, but when the engine was stopped they quickly settled into the water leg and on the crown sheet. Then, a half hour or so afterward, the engineer would start with the steam existing at the top of the boiler, open the cock *f*, close *d*, open the blow-off and by creating a current of cold water around the water leg wash out the sediment that had collected. The boiler has never exploded, has never been washed out, and the crown sheet and tubes, as seen through a hand hole, seem to be fairly clean.

Air-Brake Testing Apparatus—Boyden Brake Co.

Since the committee on air brakes which was appointed by the Executive Committee of the Master Car Builders' Association in 1891 reviewed the subject of shop tests for air brakes, and requested the assistance and suggestions of the manufacturers, the Boyden Brake Co., of Baltimore, has been at work perfecting a plan for testing that would give an automatic mechanical record of the time of application of the brakes and other records in such a way as to remove errors due to personal equations of the observers. This is an interesting piece of apparatus. The following description is from a letter received from the Boyden Co.:

Fig. 1 shows a rack for testing 50 air brakes and comparing their operation with 50 others under exactly the same conditions, and is designed to make any test required by the master car-builders. Fig. 4 shows a novel electro chronograph which gives four readings when making an emergency application of the brakes as follows: The time interval between the first movement of the engineer's valve and that of the piston of the first brake; the time between the movement of the first brake and the first movement of the fiftieth brake; the time between the first movement of the fiftieth brake and the instant 55 lbs. of air is in the fiftieth brake cylinder, and the time between the first movement of the engineer's valve and the instant 55 lbs. of air is in the fiftieth cylinder.

The complete rack is shown in fig. 1 and details in figs. 2 and 3; it contains 100 brakes, 50 being the latest pattern of the Westinghouse and 50 of the Boyden type arranged side by side alternately. Above the rack is the train-pipe for 50 cars with hose-couplings, strainers, cocks and branch-pipe as in service. The length of pipe from hose-coupling to hose coupling is 39 ft. 6 in., and from quick-action valve to quick-action valve, 46 ft. 2 in.; the total length is 1,825 ft. Each branch-pipe has a bifurcated cock (see fig. 2), and connections with the quick-action triple-valves of both the Westinghouse and Boyden brakes. Both sets of brakes thus have exactly the same relation to the train-pipe, and either kind can be thrown in or out of connection by reversing the bifurcated cock. All the Westinghouse and all the Boyden brakes can be tested separately, or the two tested together interchangeably, making a mixed train of any proportion.

To the head, *B*, of each brake cylinder (see figs. 1 and 3) a yoke, *A*, is pivoted. When making tests of 4 and 6-in. piston stroke this yoke is turned horizontally in front of the piston tube, and a suitable rod then inserted loosely in the hollow piston tube strikes against the yoke, which thus limits the stroke of the piston to either 4 or 6 in., as desired. A piece of rubber, *C*, attached to the yoke prevents severe jar and avoids breaking the bolts when applying for emergency.

The air tank, gauges, engineer's valve and chronograph are located at one end of the rack with driver and tender brakes connected as in practice.

The chronograph *Y*, shown in detail in fig. 4, consists of a drum revolved by a weight, the speed being governed by a fan *L*, so adjusted that the drum revolves exactly five times in a minute; the card which encircles the drum is divided into twelve parts each representing one second, and each part is divided into ten spaces each representing one-tenth of a second. Over the drum are two electromagnets which operate the armature carrying a pencil or stylographic pen, which is lowered and makes a dash on the card and is raised again as the circuit is closed and broken. When the circuit is closed the pen is held away from the card, but when the circuit is broken the pen drops and makes a dash on the card as the drum revolves. The circuit *M* has four circuit-breakers located respectively on the engineer's valve, the piston tubes of the first and fiftieth brakes, and on the 55-lb. recorder on fiftieth brake cylinder.

The first circuit-breaker is on the engineer's valve shown in figs. 5 and 6, and consists of a segment, *D*, attached to, but insulated from, the valve. When the valve handle *N* is in the release position the circuit is closed through the handle and one end of the segment. When the handle is turned the circuit will be broken until the handle comes in contact with the other end of the segment; therefore when the handle is quickly turned to

the emergency position the electric circuit will be instantly closed and broken, causing the chronograph pen to make a dash on the card; the pen instantly raises again in readiness for the first movement of the piston tube of the first brake. Here the circuit is broken by a device, *U*, shown in detail in fig. 7, consisting of a lift pin, *E*, which when lowered closes the circuit and when raised breaks it. The pin is lifted by an incline piece, *F*, attached to the piston tube and is lowered by a spring after the piston travels its first half-inch. The circuit wires are connected to the pieces *H* and *P*. The breaking of the circuit by the first piston tube will cause the chronograph pen to make a second dash on the card.

The piston tube of the fiftieth or last brake has a circuit breaker like the one on the first brake, and causes the pen to make a third dash on the card when that piston tube moves its first half-inch.

The last circuit-breaker device, *W*, is connected with the last brake cylinder and consists of a tube, *I*, see fig. 8; a piston, *S*, and rod weighted by a spring, *R*, which will not allow the piston to move until 55 lbs. air pressure is obtained. When it moves it breaks the circuit by lifting the head, *J*, from the piece, *T*, and causes a fourth dash to be made on the card. The end of the tube, *I*, is connected with a three-way cock, *K*, from which connections are made to the last cylinder of both sets of 50 brakes so that either can be tested by reversing the cock handle *L*.

The card from the chronograph, shown in fig. 9, is a fac-simile of nine tests made with 50 Boyden brakes, three being tests with a 12-in. stroke of the fifty pistons, three with a 6-in. stroke, and three with a 4-in. stroke. The card shown in fig. 10 is a fac-simile of nine tests made with 50 Westinghouse brakes, also with 4, 6 and 12-in. stroke. These cards are divided by cross lines to show seconds and tenths of seconds. In reading the card the space from the beginning of the first chronograph dash to the beginning of the second dash represents the time consumed between the first movement of the engineer's valve handle and the first movement of the first brake piston. The space between the beginning of the second dash and the beginning of the third dash represents the time consumed from the first half inch movement of the first brake piston and the first movement of the last brake piston. The space between the beginning of the third dash and the beginning of the fourth dash represents the time consumed from the first half-inch movement of the fiftieth brake piston to the moment of having 55 lbs. of air in the fiftieth brake cylinder. The space between the beginning of the first dash and the beginning of the fourth dash represents the total time consumed from the first movement of the engineer's valve handle to the attainment of 55 lbs. of air in the fiftieth brake cylinder.

The reading of the chronograph for the 12-in. stroke emergency application, as shown by the cards, figs. 9 and 10, is as follows:

	Boyden.	Westinghouse.
Time engineer's valve to first brake.	.10 sec.	.05 sec.
Time first brake to fiftieth brake.	2.45 "	2.55 "
Time fiftieth brake to 55 lbs. in. B. C.	.74 "	.60 "
Total time from engineer's valve to 55 lbs. in. fiftieth brake-cylinder.	3.40 "	3.55 "

Convention of the Street Railway Association of New York.

The Tenth Annual Meeting of the Street Railway Association of the State of New York was held at Saratoga Springs, Sept. 20. The President of the Association, Mr. John N. Beckley, of Rochester, presided. The first business was the address of the President, brief extracts from which follow:

Many members of the Association feared that the street railroad interests would be subjected to uncalled for attacks on the part of the legislature at its late session, and much apprehension was felt that unjust and hostile legislation might be successful in impairing the value and usefulness of street railroad properties throughout the state. The Executive Committee of this Association took early action looking to the protection of our common interests and no bill striking railroad street interests, and no bill which injuriously affected street railroad interests, became a law. A great majority of the members of our legislature are honest men, who, when informed as to the facts, will act intelligently without injury to any legitimate industry or business. There always have been and there always will be others in every legislative body who take advantage of every opportunity which ingenuity can suggest to strike corporations by the medium of unjust and hostile legislation. Thus far the street railroad companies of the state have not been injured by unwise or dishonest legislation. But immunity cannot always be secured, except as the result of diligent and intelligent effort on the part of the street railroad companies themselves.

During the past year much progress has been made in the education of the people of the larger cities of the State upon the subject of the "trolley system" of propelling street cars. Even in the city of New York, where a year ago it seemed electric cars could never be operated because of the intense and unreasonable prejudice of the people, franchises are now being obtained, and there is every reason to believe that the old-fashioned slow-moving and nuisance-causing horse car system of that great and prosperous city will soon give place on all the lines to the modern systems of propulsion by electricity or cable.

It seems to me wise, and in accordance with the best business principles, to keep a little in advance of the reasonable demands of the people with reference to improvements, additions and extensions. I do not mean that company should heed the request or demand of 1,000 families to extend a line where it will require 1,000 families to support that line when extended, but constructing an extension somewhat, perhaps in advance of the time when such an extension will pay operating expenses, is, in my opinion, as a rule, the wise thing for a railroad company to do. The same principle

obtains as to number of the cars to be run on each line, and as to other improvements and betterments of the system.

Transfers.—After a careful study of this whole question we decided at Rochester to introduce a transfer system under which a passenger can ride from any point in that city reached by the line of the Rochester Railway Co. to any other point reached by said lines for a single fare. We commenced giving transfers on this plan on Oct. 5 last. We provided reasonable restrictions and necessary conditions. The experiment has proved an undoubted success, not only from the standpoint of the passenger, but from the point of view of the company as well. There is no question that the receipts of the company have been materially increased by the adoption and use of the transfer system.

Employes.—Until March 1 the conductors and motor men of the Rochester Railway Co. were paid the same wages as were formerly paid to conductors and drivers of horse cars. We very soon found after commencing operating electric cars that we required men of higher capacity to perform the duties of motorman and conductor than seemed to be necessary with the old system. It seemed to us that as the duties of the positions which the men held under the new system were more onerous and exacting, and as it required more judgment and skill to properly handle electric cars, that the men should be paid a somewhat higher compensation than they had before received. Therefore, the company, before the men themselves made any request for an increase of wages, advanced such wages. The action of the company, of course, gave great satisfaction to the men, and the result has been very beneficial, so far as the company itself is concerned. It has been found that while the item of "wages of employes" has been materially increased the cost of operating the road per mile has in fact been diminished. This is accounted for by the fact that the men are more attentive to duty than before and more careful in the handling of cars, by the greater freedom from accidents and by the material lessening in the cost of maintenance.

I am satisfied that the management of many street railroad corporations, where electricity is the motive power, have not as yet given sufficient attention to the thorough instruction of their motormen as well as conductors, as to the function of each part of the motor, and as to the proper thing to be done by the motorman and conductor when trouble develops while the car is in service on the line. Some weeks since I had occasion while riding on an electric car in a city of another state to ask the motorman some questions about the motors he was running. I found he did not know whether the motors were Thomson-Houston, Westinghouse, Edison or Short. He did not know whether they were double or single reduction. He did not even know whether he had under his car body one or two motors. I asked him what he did in case he had any trouble on the line? And he said, "If the motor don't work I wait until another car comes along and pushes me in." I found that this motorman had been for nearly nine months in regular service as motorman in that city. This motorman knew enough to turn on and turn off the current, and to set and loosen the brake. This, of course, is an extreme case, but it illustrates a principle. My own judgment is, based upon some experience, that too much pains cannot be taken to thoroughly instruct the motorman as well as the conductor, so that each will know the cause of trouble when trouble develops in either of the motors in service.

The plan the company with which I am connected has adopted is to select from among the motormen one of the men who is pronounced by the master mechanic, the electrician and the superintendent the best posted as to the construction and use of a motor, and make such man for the time being instructor of motormen on cars in actual service. This instructor rides with motorman after motorman, observes the manner in which he handles his car under all conditions, and gives detailed instructions as to exactly what to do whenever trouble of the usual sort develops. The instructor spends from half a day to three days with each man until he pronounces him in every way qualified to run a car on every portion of the line, and to do that which needs to be done when trouble develops.

A report on

ELECTRIC TRACTION

was read by Mr. McIntire, extracts from which follow:

Electric systems as first constructed were built up altogether too light a plan, and the increasing tendency year by year has been, and is, for heavier and more solid construction in every department, but particularly in the way of track and station equipment. . . . The storage battery has made but little progress during the past year, and is not likely to cut much of a figure in electric traction until it is able to make a better showing financially than it has in the past. . . .

Track.—The improvement in track construction has been very great. During the past year heavier rails have been rolled and better joint plates made, so that it is possible to keep the roadbed in perfect line and surface. This improvement has been a great help to the electric equipment and has reduced the cost of maintenance. As the cost of laying tracks is about the same, whether light or heavy, it is economy to put in only the best.

Now, on the question of what constitutes the best form of track, there is considerable variance of opinion. My experience and observation has convinced me that the deep girder rail, about nine inches high, spiked directly to the ties, is the best form for paved streets, and in dirt or macadam streets, a six inch girder rail laid in the same manner. In the country and where the local authorities are willing, I would lay a T rail, spiked directly to the ties. The weakest place in all forms of track construction is at the joint. Every manufacturer of rails, and many of the railroad companies, have tried to overcome this trouble. Up to the present time there has been nothing brought out which surpasses a properly designed "fish plate."

While speaking of track construction, it might be well to call attention to the bonding of rails for the return circuit. Many forms have been used, and some of them are still in operation. I believe that a No. 0 copper bond wire long enough to connect with the web of the rail on each end of the fish plate is the best plan, and then grounding the whole system at frequent intervals, and abandon the supplementary wire which it has been the custom to use with the common form of bonding.

Motors.—Probably the greatest advance in any particular line has been in the matter of armatures for motors and dynamos. I consider that the introduction of the "iron clad" type will do more toward reducing the bill for repairs in that direction than any other one thing that has been introduced during the year. The electric companies have all, I believe, now adopted this form as their standard, and all roads that have tried them will, I think, agree with me that, for simplicity,

ease of repair and ability to stand the hard usage they receive, they stand at the head.

Many roads, acting under a misapprehension of the requirements, started off with motors too small for the work, and endless trouble has been the result. Some new classifications should be adopted by the electrical companies for designating the power of their motors, as the present "office classification" does not afford a proper understanding of its capacity, and the "horse-power" term is but little better, depending on so many limiting conditions. A more satisfactory way would be to specify the number of pounds the motor can pull at different speeds, with the maximum current for which it is designed.

Trucks.—The first car trucks employed in electrical work were of the pedestal form; that is, the trucks were fastened to the car body and oscillated with the car. The motors, of course, had to be suspended from the car body, and the result was that the grinding of the gears was transmitted through the whole car; also, the oscillation of the car body caused the motors to correspondingly rise and fall. This was very undesirable, and it was soon found necessary to adopt the post form, in which the truck was complete in itself and the motors supported directly on the frame of the truck. The body was connected with the truck only by springs, thus being entirely free from the jolts and pounding of the truck.

In this form slight spiral springs were first used, the same as in the previous styles, but it was soon found that the high speed attained caused the body to oscillate to such a degree that it became very objectionable, and the different builders then modified their trucks by extending the side bars beyond the axle boxes a sufficient distance to allow an auxiliary spring to be added at each end. For this auxiliary support, coil and elliptical springs have been used, both forms with marked success, and it is now possible to carry a car body 28 ft. over all, practically without oscillation. This last modification has been a very great improvement, and has settled the long car question on most street railways. I mean by this that but few double truck cars will be used, though, of course, there are places where two trucks can be used to advantage, and in such places they will still be employed. But where we are able to carry nearly as many people on four wheels as on eight, and to apply the power equally on each axle, so that there is no possibility of lack of traction, there can be no gain to the railroad company in using eight wheels.

Power Stations.—This may be rightly called the heart of any electric system. The chief element to be considered should be reliability, and, after that, economy. Just what means shall be used to attain this end seems so far to have been a disputed matter, as shown by the stations now in operation, which contain almost every conceivable device, good, bad and indifferent; all shapes, sizes and descriptions of engines, boilers and dynamos. The recent introduction of large multipolar dynamos has brought about a change in station arrangements not heretofore obtainable, and in all large stations now being built countershafting is dispensed with entirely, and the general tendency is toward reduction of parts, which in turn means simplicity. It is very probable that we have reached now a form of station that will be fairly permanent, and the main point in the future will be the size of the units. For medium size stations engines with releasing valve gear belted direct to a multipolar dynamo will be the best where the price of land is not excessive, and direct coupled engines and dynamos for larger stations. To my knowledge there have been no comparative tests made as to the economy of the various types of stations, although all reasoning would point to these latest types as being by far the most economical.

There has been heretofore too much taken for granted or assumed in electrical work, and the rapid growth of the business has called into it many who were totally unqualified for the positions which they obtained. I attribute much of the unsatisfactory work in the past to this course, but am happy to note that the great majority of these are passing into the background, and their places are being filled with men of good judgment and mechanical resources.

Mr. McNAMARA: Mr. McIntire failed to tell us if any body has tried the deep girder rail, which he refers to, and found it any better than the system which he recommended to us a year ago. We are using the ordinary tram rail; and I still hope that we are right and he is wrong. As to the large generators, it is very comforting to know that you have got a machine that is capable of delivering a large amount of power, but if it breaks down, what then? Your large unit is taken out of service, and unless you have a correspondingly large unit to take its place, you are left without power. It is a question for us whether it is desirable to increase the size of the units, and, if so, what should be the limit. Of course, I take it that the limit is only reached when you are enabled to duplicate the unit; because no one would attempt to operate a railroad, electric or otherwise, unless he were able to operate it continuously; so that if one of your large units fails, you must have another to take its place.

Mr. BECKLEY: In other words, the expression is relative. What would be a large unit for the Rochester Railway Co. would be a small unit for the Brooklyn City Railroad Co.

Mr. McNAMARA: Yes, that is it. We have found that in Albany we have worked very successfully with small generators. We have had more than ordinary success, as it seems to me, in operating small generators. Our success has been so great that it was not until a week ago that we lost our first armature—running nine or ten machines. We discovered a defect in the armature which compelled us to take it out. Lightning has been in the station numerous times, but we have escaped its destructive influences, and it has been safely carried to the ground.

Mr. MCINTIRE: The form of girder rail I refer to is laid on fifteen miles of road, in the northern part of New York. It weighs seventy pounds per yard and is laid on yellow pine stringers five by five. The rails are spiked directly to the stringer, which rest upon cross ties. I use a joint-plate 26 in. long, bolted with six bolts. I put a tie directly under the rail joint, and one under

where the timber joints; the balance of the ties are spaced 36 in. on centres.

Mr. LEWIS: Do you advocate an absolutely rigid joint?

Mr. MCINTIRE: Yes, in paving. There is nothing else that you can put there that will stand. It will go down if the joint is open and the wheels are allowed to pound. The rail men will immediately inquire, what will you do if expansion takes place? If you lay a centre bearing or tram rail in this manner, you get into trouble because it is exposed to the sun, and expansion will take place; but with a deep girder rail down in the earth you do not have that trouble.

Mr. LEWIS: Do you put your rails close together?

Mr. MCINTIRE: Yes, solid together.

Mr. BECKLEY: Did you pass through last summer with this road?

Mr. MCINTIRE: Yes, sir.

Mr. CLEMINSHAW: Is that the road you built in New York?

Mr. MCINTIRE: Yes, sir.

Mr. CLEMINSHAW: Then you have not given it a test with an electric system, except during the last week?

Mr. MCINTIRE: That is all.

Mr. CLEMINSHAW: That settles the question.

Mr. MCINTIRE: The trucking on Third avenue is equal to any wear on the track which will be given it by electric motors.

Mr. CLEMINSHAW: There is nothing known in traction that compares with the pound on the track which is given by an electric motor.

Mr. McNAMARA: I have seen some of this 70-lb. rail that was laid last year on a road operated by horses, and it has got a pound at every joint that you can hear.

Mr. MCINTIRE: It was not constructed properly. If you will lay your track and put your rails solid together, and bring the joint plates home with the bolts and properly tap as it is drawn up, and see that it is supported properly, you will have a good track. If you lay stringers you have got to put on knees, and this increases expense, and the deep girder rail is almost as cheap to lay as the other forms. As to dynamos, I have not seen any that begin to compare with the new type of ironclad armature, multi-polar dynamo, and I cannot see why we should have any trouble with them. Of course, if something happens to the engine you must have a relay.

Mr. POWERS: To my mind the first question that presented itself in this matter of electric roads and tracks was the problem of the joints. The steam roads have solved this question to their satisfaction, perhaps not altogether, but practically so, so that you cannot count the joints as you ride over the best tracks. The general idea of the railroad man is to make his rail continuous, and then the question of supporting the joint becomes one of secondary consideration. The ordinary joint for street railroad tracks and electric railroad tracks has been merely something for keeping the ends of the rails from spreading apart vertically. After all the experience the steam railroad people have gone through, and the enormous weight they get on a single pair of driving wheels, the fact that they have solved the problem to their satisfaction should be of value to us; while most of the so-called joints in the street railroad business have been formerly tried on steam roads and are not satisfactory. It is no uncommon thing to find a new piece of electric track going to pieces in a short time. One reason is the sparseness with which the ties are apt to be put in. We put them in less than 2 ft. apart centres; less than 16 in. at the joints. We stagger the rail joints.

Mr. CLEMINSHAW: Any one who runs an electric road six months knows that there is nothing so important as this matter of joints. The steam roads can screw up the nuts at the joints. We cannot do that in a street railroad, as they are underground. There is not an electric road in existence to-day that has run one year that has got a perfect joint. We built a road about 15 months ago, 63-lb. rail, new pavement, new ties 30 in. apart, and everything first-class. It ran six months very well, but to-day it is going. There is no remedy. We have come the nearest to it with a suspended joint.

Mr. George W. McNulty, Engineer of the Broadway Railroad, New York, was to have prepared a report on "Recent Improvements in Cable Traction," but owing to the fact that it had not been possible to get the road in operation before the time of the meeting, as was expected, he requested that the report be deferred until the next meeting. The request was granted.

The Baines Car Truck.

The subjects that I have to speak of at this meeting are those of Track versus Rolling Stock and Rolling Stock versus Track, and more especially to give a history of certain cattle cars and 500 trucks that have for about four years been in use without any mishap, the property of the Lackawanna Live Stock Express Company, running between New York and Chicago, passing over the lines of the D. L. & W. and N. Y. C. & St. L. companies. Each set of the trucks and car body have during the time made a run of about 6,000 miles per month. However, for the purposes of this paper, I deal with the first three years.

The cars are 31 ft. long inside, having a camber of

* Extracts from a paper read before the New York Railroad Club at the regular monthly Meeting of Sept. 15, 1882, by Mr. Hugh Baines.

1½ in., the draw timbers being adjusted so as to bring the centres of the draw bar to standard height from rail. The careful attention of the General Manager, Mr. Hegeman, in having the nuts of the frame and tension rods screwed up, has kept the cars in line. The wheels that have been and are in use were made by the Buffalo Car Wheel Company, and the cars were built by the Buffalo Car Manufacturing Company.

Mr. John Mackenzie, President of the American Rail-way Master Mechanics' Association, who, by his company had been asked to examine a sample cattle car that was built with these trucks under, reported as follows: "I can find no fault with either the car or trucks." In about two years after the date of Mr. Mackenzie's report another eminent railroad engineer was by Mr. Hegeman asked to examine and report on the trucks, and he did so and reported as follows: "This truck is given a slight lateral movement by means of rollers, sufficient to relieve binding. The truck is very substantially built, and besides being easy riding it is very strong and durable. Trucks of this kind that I have examined after being in service for two years show no indications of weakness or wear of parts. For the fast train service now becoming common in rushing live stock to market we know of no truck better suited than this one for combining safety and efficiency." After each set of trucks had made a run of 216,000 miles, I examined them, and found that they were in about the same condition as they were when examined by the engineer I last referred to. At the time of his examination each set of trucks had run 180,000 miles, the wheels averaging without change 150,000 miles as against 50,000 or 60,000 miles, the average life of a cast wheel in any kind of swing or rigid truck frames. The saving in wheels is solely due to the construction of the frame of this truck. Each of these trucks having run about 6,000 miles per month, or 216,000 miles in three years, against 64,800 miles by ordinary truck, has made in three years the ten years' mileage of the ordinary truck.

A set of these trucks has carried in three years 540 tons 216,000 miles against 738 tons 64,800 miles by ordinary truck, equal to carrying in three years 1,062 tons more than the ordinary truck the whole distance it makes; of which I now give comparisons in detail as follows: A set of these trucks has carried car body, say 8 tons, bedding 1, cattle 12, car body returning empty 8, bedding 1, total 30 tons or an average of 15 tons a distance of 216,000 miles in three years. Common truck has carried car body say 8 tons, bedding 1, cattle 12, return car body 8, merchandise 12, total 41 tons or an average of 20½ tons, which makes 738 tons a distance of 64,800 miles in three years. Thus showing that the truck I speak of has made 3½ times the mileage of the common truck in three years, that is, it has done 2½ times the work, at a nominal cost for maintenance, as compared with the ordinary truck and car. Although the cars on these trucks have run empty one-half of the distance traveled, yet in the year said trucks have carried 354 tons more than the common trucks, over 50,400 miles, and if cars had been loaded both ways the economical results shown would have been more marvelous.

When these trucks enter curves they do not throw more of the car weight on the wheels that travel on the high or outer rail than they do on the wheels that travel on the low or inside rail; hence, there is but a very slight friction between the inner edge of the head of the outside rail and wheel flange, thus less power is necessary to draw the train, and a great saving in both wheel flange and edge of rail is made due to the use of the roller placed between top and intermediate transoms for the purpose of giving lateral motion; and by use of rollers rather than flat frictions, said rollers being placed between the top truck transom and the car body transom, the trucks are left free to curve very easily under the car and its load. The main springs, being placed almost in line with the outside edge of the car, prevent the rolling seen in all other cars.

The springs in the axle boxes are kept compressed by means of the axle box bolts, so that when the car is running and the wheels strike a projection, the springs do not vary more than one-sixteenth of an inch in length, that being sufficient to relieve the journal from the jar.

The Charleston Harbor Improvement.

BY GEORGE Y. WISNER.

Recent dispatches from Charleston state that on Aug. 26 the U. S. revenue steamer "Morrill," doing duty on the coast of the Carolinas, had on that day, in the interest of commerce, ran a careful line of soundings through the entrance of the new jetty channel off Charleston. The run, it was stated, was made at a time when the tide registered *six inches below high water mark*, and the resultant of all the casts made and taken with every regard to accuracy, was a minimum draft of 14 ft. 6 in. It is stated that the object of the examination was to show that absolute results are being obtained in the work in progress at Charleston to obtain at low water a 21-ft. channelway to the sea.

The importance of this announcement depends on the amount of favorable change that has taken place in the channel under improvement since the work was commenced.

The average rise and fall of the water surface at Charleston for a spring tide is about six feet, and as the soundings were taken by the "Morrill" at a stage

six inches below high water mark, it is evident that at mean low tide (the plane of reference of government charts) the soundings would have been 5½ ft. less than those given, or 9 ft. for minimum depth. The following table gives the minimum depths in the channel under improvement, at mean low tide, as shown by the different government surveys made since 1852:

Year.	Minimum depth.	Year.	Minimum depth.
1852	8 feet	1884	12 "
1856	9 "	1885	11.5 "
1858	9 "	1886	10 "
1860	12 "	1887	10 "
1870	12.5 "	1888	10.5 "
1878	12 "	1889	10.5 "
1879	13 "	1890	11 "
1890	13.5 "	1891	11.7 "
1892	13 "	1892 (Morrill)	9 "
1893	12 "		

From the above it would appear that the soundings made from the "Morrill" were not in the best channel, or else there has been considerable shoaling since the survey of May, 1891. The depth of 13.5 ft. at mean low tide in 1890 would have given at half tide a minimum depth on the bar of over 16 ft. Of such depth the Charleston correspondent says: "There have been recent reports spread among masters of coasting vessels to the effect that 16 feet of water is obtainable as a minimum cast in the new jetty channel at Charleston at half tide. Such reports are calculated to greatly mislead, if not to do actual harm." It would therefore seem that the present depth in the jetty channel is not so great as that of previous years.

In this connection a brief history of the work and the results obtained may be of interest. Previous to 1878 Congress appropriated \$144,700 for the improvement of the harbor, which was expended in the removal of wrecks and dredging that had but little effect on the channel depths maintained. In 1878 the United States Senate passed a resolution requesting the Secretary of War to furnish information concerning the practicability and cost of constructing permanent work of improvement for the ship channel at the entrance into the harbor of Charleston. In accordance with this resolution the engineer officer in charge of the work designed the plans now being carried out, and estimated that the cost of the work when complete would be \$1,800,000. The project consists of two jetties of log and brush mattress foundations, about 2 ft. thick, with rip-rap superstructure. One jetty commences on Sullivan's Island and the other on Morris Island, and they converge toward each other for a distance of about 12,000 ft. from their shore ends, and thence are nearly parallel and about 3,000 ft. apart to the outer crest of the bar. The outer parallel portions of the jetties (4,000 ft.) were to be built to mean sea level and the submerged shore ends to have 12 ft. to 15 ft. of water on their crest at deepest points.

It was expected that the flood tide would enter the harbor over the low submerged jetties and quickly fill the tidal basin, and that the ebb tide would flow out between the high parallel portions of the jetties producing channel depths of 24 ft. to 75 ft. across the bar. This conclusion was arrived at from purely theoretical discussion of what the flow in the channel ought to be, and not from observations made for determining the actual current velocities. The actual results that have been obtained would rather indicate that there was something wrong with this theory in regard to tidal flow.

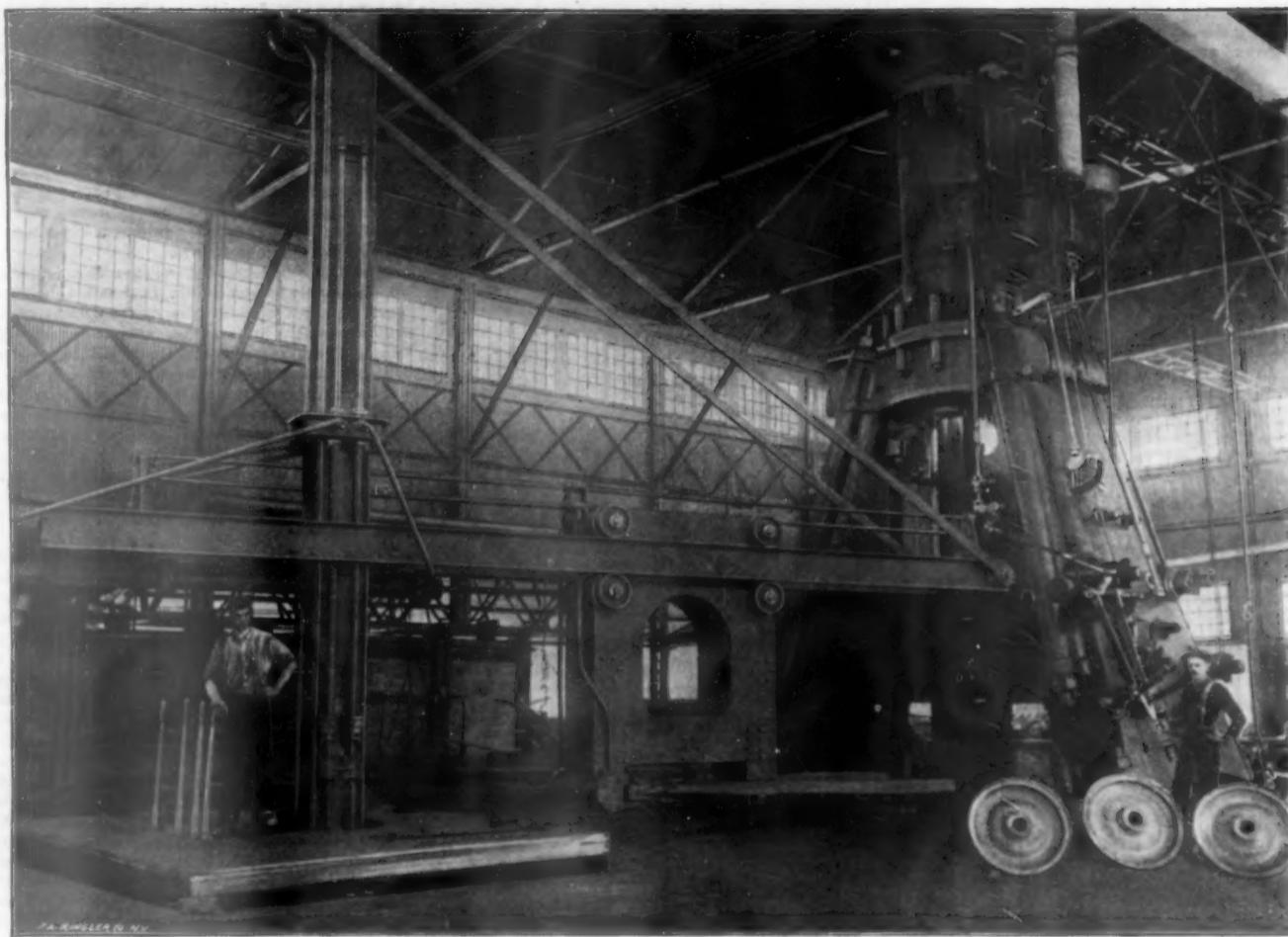
Since 1878 the following appropriations have been made for carrying out the project as originally designed and since modified:

1878	\$200,000	1881	\$250,000
1879	9,000	1888	187,500
1880	170,000	1888	350,000
1881	175,000	1891	370,000
1882	300,000	1892	225,000
Total			\$2,427,500

In addition to the amount appropriated in 1892, it was provided that the Engineer Bureau could contract for additional work, not to exceed \$1,953,000, to be paid for as appropriations may be made, making a total of \$4,380,500 to complete the work as now projected.

In 1888 the appropriations made having exceeded the amount estimated to complete the improvement and the works not having produced the expected results, the Engineer Bureau modified the original plan and proposed to raise the submerged portions of the jetties to low water level and at the same time dredge a channel across the bar instead of trusting to tidal currents to produce such result. During 1889 and 1890 dredging was carried on by contract, and in 1891 the Engineer Bureau had a powerful steamer dredge constructed especially for the purpose, which it is presumed has been in service for over a year dredging the channel across the bar; but as the last annual report on the work has not yet been made public no definite statement can be made as to the amount of work done or the results obtained.

An examination of the changes that have occurred in the jetty channel since the commencement of the work rather indicates that the lump sum that has now been appropriated to build the jetties up to mean low water will not be sufficient to obtain and maintain a 21 ft. channel across the bar at mean low tide. In 1890 the outer 7,000 ft. of the jetties was built up to about mean low water level, yet since then the average depth through this section has remained about the same. And even if the entire jetties are raised to mean low water level the flow of water over their crests during ebb tide will be such that no materially increased scouring effect will occur in the outer portion of channel. The excessive width between the jetties is such that they will afford but little protection from wave action, and it is probable that be-



WHEEL SHOP OF THE BOIES STEEL WHEEL COMPANY.

fore a 21-ft. channel can be obtained the jetties will have to be built to high water level and about 4,000,000 cubic yards of sand dredged from the bar. This additional work would cost about \$2,000,000 in excess of that already appropriated, making a grand total of \$6,380,000 to complete the work.

The commercial importance of the improvement is such that at this increased cost (three and one-half times the original estimate) no one will regret the ex-

penditure if the desired results are obtained. The only questions that may be raised are whether the improvement may not be accomplished much more quickly and cheaply by some other plan, and whether the reports that are being circulated in regard to the favorable results obtained are warranted by the facts in the case.

It seems to have been the opinion of the engineer officers in this case, as well as at several other harbors where similar improvements have been attempted, that to obtain a maximum scour from the tidal currents the tidal basin must be filled with each tidal fluctuation. This, however, is not the case, as may readily be seen by considering what actually occurs at harbors having tidal channels of relatively different dimensions.

In case of a large channel entrance, as compared with the area of the tidal basin, the reservoir will be so quickly filled that its level will differ but little from that of the sea outside, and will have a very small slope through the tidal pass, similar to that at Charleston harbor in its present condition. When, however, the tidal entrance is small, as compared with the area of the basin, the level of the reservoir will vary but little from mean sea level, and consequently at high and low tide the slope through the pass will be nearly that due to one half the tidal fluctuation. It is therefore evident that if the jetty channel had been made as narrow as safe navigation would allow and the jetties raised to high water level the slope through the channel would have been greatly increased over that which will be obtained from the present plans, and at the same time the channel would have been protected from wave action and consequently rendered more permanent and safer for navigating.

DETROIT, Sept. 20, 1892.

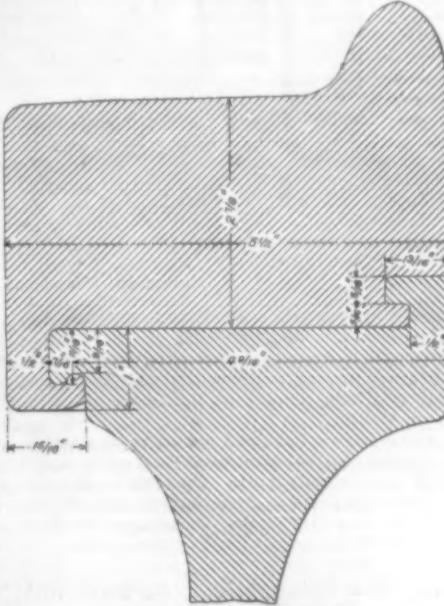
The Boies Wrought-Iron, Steel-Tired Wheel and Integral Tire Lock.

The sectional view herewith shows a new design of wheel with wrought-iron centre, steel tire and new tire lock. This tire lock, called the Boies integral tire lock, was invented by Colonel Boies, the President of the Boies Steel Wheel Company, Scranton, Pa. The measurements of the tread of the wheel are omitted, because they are exactly those of the M. C. B. Standard. Those of the tire fastening are shown in full.

The company decided upon the materials for the wheel, for the reasons that, as they say, experience has demonstrated that forged iron is the most reliable metal obtainable for the hard and continuous pounding to which wheels are subjected. It is the most uniformly strong, durable, flexible, least liable to fracture, and least subject to change in service, of any of the cheaper

metals. While steel may be made superior to it in some of these respects, it apparently cannot, as yet, be made much more uniformly reliable than cast iron for wheel service, except when it has been forged and rolled into tires. Inexplicable failures occur in its use for centres nearly as often as with the best cast iron wheels. Absolute security from breakage being the principal reason for the use of the more expensive steel-tired wheel, wrought iron seems to be essential for the centre of them.

The company adopted for the centre a continuous plate



Boies Integral Tire Lock.

as being the most secure; for, being integral and without welds, there is no danger of breakage due to imperfect welding or of the breakage of separate pieces. The centres are forged from No. 1 scrap iron at a welding heat under a heavy hammer, and the forging is a complete centre ready for turning. It is claimed that this centre gives the greatest obtainable security, and that the cost of maintenance is reduced to the actual amount of tire worn off in service.

In order to get the proper requirements for wear of the tire, it is considered necessary to use steel, and therefore two parts must be used, but this wheel is



The Boies Steel Wheel.

reduced to the simplest form possible as only two parts are used. The tire fastening is based upon the principle of the Mansell ring. One of the rings is part of the centre and permanent, the other part of the tire. These are interlocked and the parts held together by peaning or rolling the under lip of the tire retaining ring up into a groove in the centre, and it is believed that this form of fastening will effectually hold any broken tire securely. This locking device also permits the extension of the felly of the wheel under the entire bearing surface of the tire giving it support throughout.

When it is necessary to renew the tire, the under lip can be cut off in a lathe without injury to the centre, and a new tire put on in the same way, in any railroad shop where there is a wheel lathe and press. Thus one of the principal items of the cost of renewals, the freight back and forth to the wheelmaker, is saved.

The shape given to these centres is an important consideration, as it allows the tire to be pressed on while

the belt. The spindles are of cast steel and has a vertical movement of 18 inches. Each spindle is driven at a different speed to suit the auger and is provided with a stop to gauge the depth of boring. All spindles pass through a sleeve pulley and consequently do not come in contact with the journal boxes. The spindles are also provided with self-oiling boxes at the top.

The roller frame is very heavy and of large surface, and is made to carry six feed rolls, all driven by friction, and operated both ways, being controlled by the foot. If it is desired, the rolls can be thrown out of gear when the foot is released from the treadle, by the means of the large hand wheel. All the movements in this machine are actuated by one belt. Timbers 15×16 can be bored through at one operation.

How to Meet Safety Appliance Legislation.

BY EDWARD B. WALL.

Congress did not pass a law at the session just concluded on the application of air-brakes and automatic

without such brakes after July 1, 1895—three years. The Senate bill modifies this greatly. It stipulates that by Jan. 1, 1895, there shall be a sufficient number of cars in a train equipped with automatic brakes to enable the train to be controlled without hand brakes, and says nothing about the further equipment of the cars.

On couplers, the House bill enacts that all cars shall be equipped by July 1, 1898—six years, and that no new cars which have received general repairs since the passage of the act shall be hauled without automatic couplers after July 1, 1895—three years. These provisions are the same as those for air-brakes. The Senate bill places the limit for the equipment of all cars at Jan. 1, 1898—five and a half years.

It will thus be seen that when a law is passed, we shall probably be given from two and a half to three years in which to equip locomotives with driver brakes; from five and a half to six years to equip cars with couplers; six years in the House bill to equip all cars with air brakes and five and a half years in the Senate bill to equip about one-third of the cars. I estimate one third, as this is about the safe number experience has shown would be required to meet the conditions stipulated by the Senate. In order that this burden may be spread over as long a period as possible and that we shall not have to undo what we are to-day doing, it is essential that we should adopt a policy which will cover, viz.:

First.—All new locomotives shall be provided with driver brakes. It would be well, where the railroad company is able, to further issue instructions that driver brakes shall be placed on all locomotives receiving general repairs. The close agreement between the Senate and House on a very short allowance of time to accomplish this work points to the fact that we shall be greatly hurried if we do not commence now. It may be said for this expenditure that there are few other investments on a railroad that will bring such immediate beneficial returns.

Second.—All cars built from now on should be equipped with air brakes. I recognize that the treasury of some railroads will not permit this, however wise the expenditure, and that it will be necessary for them to wait until a special loan is raised for the purpose; but no matter how poor the road, it will be the victim of the most short-sighted economy if it does not adopt a brake rigging on all new cars that will operate with the air brake.

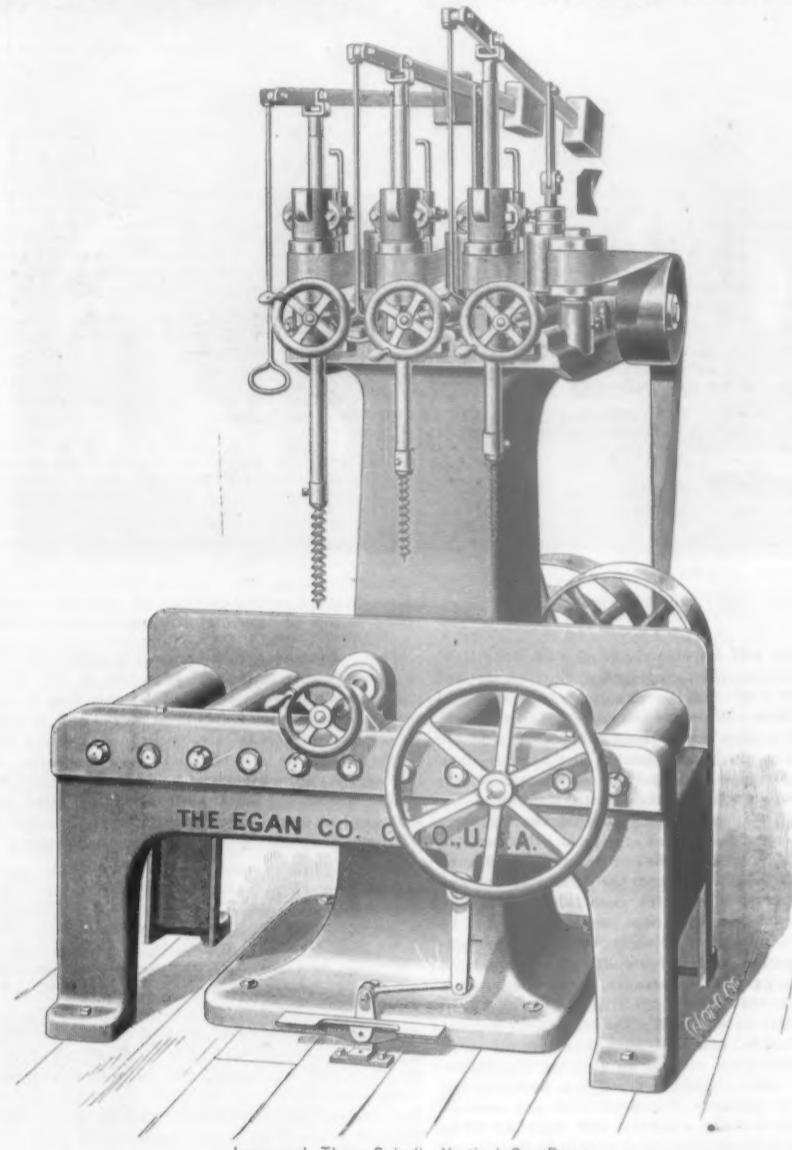
It has now become generally understood that the air-brake cannot be made to perform its functions with the old brake rigging in use on cars provided simply with hand brakes. The Master Car Builders' Association has, happily, solved this part of the problem for us. They adopted a brake rigging in 1889 that has successfully met the requirements of service and is now universally adopted whenever air brakes are used on freight cars. If we place this rigging on our cars, we shall simply have to add the equipment furnished by the air-brake companies to have them fully equipped with automatic brakes; otherwise we shall have left on our hands a brake rigging that will be worth scrap, less the labor of taking it down and putting up the new rigging.

Third.—All cars built in future should be equipped with automatic couplers. Where railroads cannot afford this, as in the case of air brakes, they should adopt a draft rigging that will receive the automatic coupler by simply removing the old draw bar and tail pin and putting in the new coupler with its tail pin.

Fourth.—In repairing cars, all old draft riggings removed should be replaced with new draft rigging designed to receive the automatic couplers. This should even be done on very old cars—cars that have, say, but two years left of their life, because the rigging will then, in most cases, be available for use in repairs. This application of a new draft rigging on repairs is of great importance. We have on hand, on most railroads, sufficient material to maintain the running repairs on our old draft rigging between now and the period when we shall be compelled to equip exclusively with automatic couplers. It is on cars and in stock. It is the part of wisdom to stop manufacturing any more irons for this purpose and to put on new rigging at such a rate as will maintain the general repairs, using the old irons removed and in stock for running repairs on the old style rigging. This may necessitate, occasionally, the bringing in of cars to the shop to remove the old draft rigging, but even then it is to the advantage of the railroad company, as it all tends to reduce the enormous pile of scrap which will be left on hand when the period of grace granted by law has expired. If we do our duty, that pile will be largely worn-out irons and scrap *de facto*, and not simply scrap *de jure*.

Fifth.—The application of couplers to cars now in service should be at a rate, irrespective of any probable law of Congress, equal to the consumption of the present draw bar. This condition would entail on many railroads an expense that they could not at present bear, but for those who can meet the condition, it would be greatly to their advantage.

The five and a half to six years that Congress proposes to grant represents a little more than the life of the present draw bar, which I estimate at from four to five years. It must be recognized that such an estimate is only tentative, on account of the present very large admixture in service of automatic couplers and the constantly increasing number of consolidation engines and



Improved, Three-Spindle Vertical Car Borer.

expanded by heat, and the centre to be so compressed by its contraction in cooling, that when the tire is afterward expanded by the heat of the brakes, the centre will again follow it out, and continue to be tight in the tire, preventing it from slipping on the centre when the brakes are applied.

The wheels have a light and attractive appearance, which, coupled with their good mechanical qualities, will doubtless make them popular. The company has just completed a large plant in Scranton for manufacturing these wheels on a large scale. The centres will all be made of a standard diameter for the various sizes.

Improved Three-Spindle, Vertical, Car-Borer, With Power Driven Rolls.

We show the latest improved vertical boring machine for car and bridge work brought out by the Egan Company, of Cincinnati. It is especially designed for boring heavy and light timbers with accuracy and speed.

The column is cast hollow with ample floor space. The roller-frame is bolted to the front of the column, making a heavy and stiff machine, capable of standing up to heavy work on large timbers. The slides which carry the spindles have a movement of fifteen inches, each independent of the other, operated by hand wheel and screw, and working in planed ways, with gibbs to compensate for wear without changing the tension of

couplers, although the House of Representatives passed the G'Neil Bill, which would have become a law if the Senate had agreed to it and had not had a bill of its own. If the session had been a little more protracted, it is very probable that an agreement would have been reached between the two bodies and we should have had a compulsory law. The indications are that a law will be enacted at the next session and it therefore behoves us to consider the probable character of such a law and what steps we should take in the construction and repair of our equipment, to the end that we may not, at least, do anything which will increase, rather than diminish, the cost of adding new appliances to our cars and engines.

We might as well make up our minds that there is going to be a law and, with this in view, we should be blind indeed if we did not take every step to alleviate the burden on our companies of what will, at best, be an enormous expense.

The bill passed in the House stipulates that all locomotives in interstate traffic shall be equipped with driver brakes by July 1, 1895, and that no new locomotives shall be put in such traffic without driver brakes after July 1, 1895. The Senate bill simply provides that all locomotives shall be equipped by Jan. 1, 1895.

On automatic brakes for cars, the House bill requires that all cars shall be equipped by July 1, 1898—six years—and that no new cars, or cars which have received general repairs since the passage of the act, shall be hauled

heavy cars, together with due consideration for the different kinds of metals used in, and the designs of, draw bars. If we were, consequently, to stop buying new link-and-pin draw bars and restrict our purchases to automatic couplers, depending upon a supply of old draw bars for running repairs from those removed in service, we should, at the expiration of the legal period, have no second-hand draw bars to throw into the scrap pile, and we should have enjoyed the benefit of all our investment in link-and-pin draw bars. This course would secure a gradual and natural conversion of draw bars into automatic couplers. The cost would distribute itself in a normal way.

Sixth.—All automatic couplers purchased should be subject to the proposed tests of the Master Car Builders' Association, which stipulate that couplers shall meet a certain drop and tensile test. This secures good and safe malleable iron, cast steel and wrought iron. The M. C. B. type of automatic couplers has now reached such a stage of development that thoroughly good couplers can be purchased from several manufacturers. The prices asked are not excessive and they are in very close conformity. Therefore, there no longer exists such a great dissimilarity in prices as to lead some railroads hard pressed for money to purchase inferior goods. The M. C. B. coupler has become a regular article of commerce. It is so simple a matter to devise a slightly different form from any now in service that it can never become a monopoly. As a consequence, the trade of any one manufacturer depends upon the quality of his goods and the price at which he is willing to sell them. If we hold him up to the M. C. B. tests, the quality will not decline to the danger line. The general prices now charged are certain to be reduced to the simple basis of a manufacturer's profit. After the coupler has been longer in use there will be no necessity for the liberal guarantees now given by some of the coupler companies. These guarantees are now, of course, provided for in the price. Prices will also be reduced by competition, which will compel coupler companies to manufacture their own couplers. At present many of the companies are charging two profits; one on the device and the other on the manufacture, as they farm out all their orders to independent foundries, which must have their profit. In addition to this, competition will produce further improvements in the detail operation of the devices.

Seventh.—All automatic brakes should conform to the standards of efficiency proposed by the Master Car Builders' Association. A number of air brake companies are now preparing to put new systems and new devices on the market, and every railroad company, for its own protection and to secure interchangeability in operation and maintenance with other railroads, should stipulate, before introducing a new brake, that it shall meet the standard requirements not only in effect, but in fact, as determined by a test on a rack and also on a train.

It is not my purpose to here criticize the two bills before Congress or to point out how they might be changed in order to accomplish the end desired with a minimum of hardship to the railroads. A large majority of the railroads are in favor of automatic brakes and couplers. This is proved by what they have done and are doing. They believe in them for the safety they bring to their employees and the improvement they afford in transportation. What they have done has been almost entirely of their own volition, and, if left to themselves, most of the roads would add the brake and coupler appliances as fast as their revenues warranted. Both branches of Congress have very wisely proposed to reach a settlement of certain points in their bills through the American Railway Association, and it is to be hoped that when they enact a law they will also make that association the vehicle through which the vote is taken on a standard coupler; or, that, if they do not, the association will cast the vote of the railroads included in its organization. This will simplify the matter greatly for the Interstate Commerce Commission, and will enable the railroads to act with a uniformity and decision that would be otherwise impossible.

We can leave to the strong and able Committee on Safety Appliances of that association the question of uniform action after the law is passed, but we must decide now, each road for itself, what policy it will pursue in applying air brakes and automatic couplers to the cars it is now building and repairing.

COLUMBUS, Sept. 21, 1892.

Car Heating by Steam.*

In dealing with steam heat in cars we are met at the outset with two distinct theories and systems by which the end desired may be accomplished, namely:

First: The "Direct" system, which admits live steam directly into the radiating pipes in the cars; and

Second: The "Indirect" system, which circulates heated water in the radiating pipes, the water being heated by immediate contact with live steam. I believe that in the present embryostage of steam heating in cars each system has its own proper sphere, and in that sphere can fill the requirements better than any other.

In our passenger equipment we have two distinct classes of cars to heat—coaches and sleepers. The coaches are built mostly with only one compartment, and are constantly subject to opening of the doors. They usually have only single windows, which are sometimes loosely fitted and without weather strips to keep out the cold air. With

the present general lack of auxiliary steam plants at many points of our lines, where passenger coaches are stored, there is the necessity of quickly warming up a car which is put in a train. As coaches, unlike sleepers, have no special attendant in charge of each car, there is need of great simplicity and freedom from use of apparatus which will cause trouble by neglect. All of these points seem to me to be best cared for by the use of the direct system of steam heating in coaches.

On the other hand, in the sleepers and compartment cars, many of the conditions are just the opposite, and I am of the opinion that the indirect system of steam heating is better adapted to give satisfactory results.

On the road with which I am connected, we have had in use in coaches both systems of heating, and with the indirect have tried four different kinds. We have had weekly and sometimes daily complaints of freezing traps, lack of circulation, cold cars, burst pipes, etc., while from the direct system generally only one complaint has been heard, that of occasionally too much heat in mild weather. The result of the above experience, after three or four years repetition, has been to cause the adoption by the Lake Shore & Michigan Southern of the direct system for all coaches, baggage and mail cars. On sleepers the experiment has been tried with both systems of heating, resulting in the almost immediate abandonment of the direct system, for when the berths were made up for the night, and circulation of air was arrested behind the curtains, the heat became too oppressive for sleeping, and the porters were too apt to neglect the regulation of the heat, if indeed it were possible to properly regulate it. This result, of course, left the indirect system alone in the field for this class of cars. As there were many indirect systems proposed and used, it became a study to see which was the best, and to remedy as far as possible all existing defects.

It must be said of my experience with indirect steam in sleepers on the rear end of from 12 to 14 car trains, that in zero weather the complaints of cold cars, with temperature not above 60, were very numerous, and this with a pressure from the locomotive of 80 lb. It has also been found in such cars in zero weather, that with cars cool when leaving a division terminal, and from 2 to 10 lbs. of steam on the gauge, it would take from 1 to 3 hours before a temperature of 70 was reached, and in many cases but little rise in temperature was obtained even in this time.

Couplers—Here I realize that it is necessary to tread lightly. I will say that experience has demonstrated that in the matter of couplers, a coupler having flexible wire bound rubber connection is much cheaper and freer from breakage than any so called flexible metallic connection that the writer has yet seen in practical use. A well made rubber hose, five-ply, wire bound, made of not pure rubber, will stand at least one season's service without failure, and such hose are now made and guaranteed for such a time. It can also be said truthfully that there are in the market steam couplers, free from leaking, simple in manipulation, and highly satisfactory, that have now successfully stood the test for years. On the Lake Shore we are using the Sewall, which fulfills the above description, and is doing good service.

Three-Way Valves.—The controlling of steam in the train pipe of the individual car is done in three different ways that have come to my notice.

1. By a single three-way valve, located generally near the centre of the bar.

2. By two single valves, located near the centre of car, one in train pipe on each side of opening of the branch pipe.

3. By cocks located in train pipe at each end of car, under platform.

To the mind of the writer, the single three-way valve was by far the best plan, as by its use, with one turn, all the results obtained by either of the other two valve methods can be obtained. It is simpler to understand and manipulate, less work to apply, and less liable to allow a place for condensation to collect and freeze. The system with cocks under the platform is very objectionable from the fact that in case of accident, or if it is desired to blow out the train pipe, the cocks can only be opened or closed by stopping the train and getting under car.

The best three-way valve should be so arranged that the water from the drip will pass through or be in contact with it, so that when there is any steam in the train pipe the drip outlet can never freeze. The adoption of a uniform style of floor plate and marking is very desirable, especially in the case of sleepers or other cars which are interchanged by different roads.

Radiating Pipes.—When the use of direct steam for car heating was first adopted, there was a fear of instant heating, and a mistake was made by the use of altogether too much radiating pipe. Now the most approved arrangement consists of two lines of 2 in. pipe on each side of the car, without any spurs or radiators under the seat. In some cases it has been deemed best to use 1½ in. pipe, and, in addition, a short 10-in. spur under alternate seats.

With the indirect system of heating, experience has shown that there has been a leak of the requisite radiating surface, and it is being gradually increased. The prevailing practice has been to use one and a quarter inch pipe, and the same amount of it as with the simple Baker heater. In the writer's opinion, much better results would be obtained in long cars by using not less than one and a half inch pipe, thereby allowing freer circulation and increasing considerably the radiating surface.

The radiating pipes of each side of the car in the direct system should, for proper regulation of heat and adjustment, have a separate steam controlling valve, and a drip valve, also a separate pressure gauge.

Steam Admission Valves.—In this feature lies much of the secret of successful results in the direct system of car heating. Most cars at present are equipped with an ordinary cheap globe valve to control the admission of steam to the radiating pipes. With such valves in good order, if the valve is just started from its seat by a small fraction of a turn of the spindle, there is an opening made for the steam admission as large, if not larger, than the supply opening from the locomotive boiler. This admission of steam is enough to keep the car well heated in freezing weather, after it has once been warmed up. If the weather is mild, and only enough heat wanted to take away the chill to the air, it is impossible to graduate the valve sufficiently fine, but an approximate result must be obtained by alternate turning on and shutting off the steam, which, of course, results in great dissatisfaction.

Another difficulty with the common globe valve, for an admission valve, arises from the fact that it can be kept in order but a short time. After a few months' use they become so warped that few of them can be closed absolutely tight, and many times it becomes impossible to cool the cars off, except by shutting steam out of the car

at the three-way valve. To overcome these difficulties, and to put it within the power of a reasonably intelligent trainman to regulate the amount of admission of steam to the amount passing through an aperture 1-100th of an inch in diameter if desired, committee was some months ago appointed by the heads of the mechanical departments of some of the Vanderbilt lines, to prepare specifications for a suitable valve. The result has been that two reputable companies are now prepared to furnish at a reasonable figure a valve having all parts subject to wear renewable at small cost, leaving the shell of the valve intact; the valve is capable of an adjustment such that one full revolution of the spindle will give an area of opening of only about 1-100th of an inch, the valve being capable of opening to full area of a 1-in. pipe. The valves are so constructed as to be especially free from cutting out by wire drawing of steam.

Traps.—If the inspectors and trainmen on our roads are carefully questioned, it will be found that traps are a source of constant trouble, sometimes from freezing up or choking with water and sometimes from allowing too much steam to waste. Of all the traps examined by the writer, after they have been in practical operation for any great length of time, none have been found but what need constant readjustment to suit any material changes of outside temperature.

In view of these facts, many companies have abandoned the use of traps, and have substituted a much more satisfactory method of caring for the condensation, namely, the use of a globe valve at the end of the radiating pipes on each side of the car. In some cases it has been deemed wise to file a small groove in the valve seat, so it can never be entirely closed. Such a groove is intended to be large enough to take care of all condensation in mild weather, and in cold weather the trainmen are expected to adjust the opening of the drip valve to suit the amount of condensation. By others it has been thought best to leave the drip valve intact and allow trainmen to regulate it for all conditions. This arrangement permits of allowing the condensation in mild weather to partially fill the radiating pipes, and the heat to be then controlled by the amount of condensation allowed to pass off. It can be readily seen by this arrangement that if half the pipes were filled with water the steam would only reach and heat the other half of the pipes.

With the present state of invention in relation to traps, I think the plain drip valves have decided advantages. In this connection I would recommend that where possible the steam admission and drip pipes should be kept in contact and covered in the same jacket, and the outlet of the drip be in contact with the three-way valve, or pass through it, as is arranged in one style of three-way valve now on the market.

The Vanderbilt Standards.—It may be of interest to know that since last spring a committee representing several of the Vanderbilt roads have had in hand an investigation of the matter of steam heating for cars, and a summary of the results of their work is contained in the following recommendations for adoption:

1. That the "Direct" system of steam heating be used for heating coaches.

2. That the "Indirect" system of steam heating be used in sleeping cars.

3. That in the "Indirect" system, salt water, or a non-freezing mixture to be used in the circulating pipes.

4. That a three-way valve be uniformly used for controlling the steam in the main train pipe, the parts located inside the car to be uniform, the valve to take a solid (male) wrench, and the marking on floor plate to be uniform, and to indicate the direction of the main train pipe, and the branch supply pipe, and to be similar in size and style to the Martin floor plates, now in general use on the roads represented.

5. That we approve and adopt for general use the style of steam controlling valves as designed and made for our committee by Fairbanks & Co., of Boston, and by the Safety Car Heating & Lighting Co., of New York.

6. That the use of traps for taking care of the drip be dispensed with.

7. That we use a globe valve for the drip valve with a small slot filed in the seat of the valve, so it can never be entirely shut off.

8. That two lengths of 2-in. pipe on each side of the car with no spurs under the seats are sufficient for satisfactory heating.

9. That for "Indirect" heating, all pipes and connections, except train pipe, shall be maintained inside the car. That the system be limited to one steam valve and one drip valve, placed uniformly in all cars.

10. That at all terminal and junction points, where passenger trains are made up, or cars are likely to be set off, facilities be provided for heating cars by steam, when not in trains. This we consider very essential to the successful working of any system of heating cars by steam.

Following the recommendations of the committee above referred to, the Lake Shore road has adopted a system of direct steam heating for its coaches.

The Lauterbrunnen-Mürren Mountain Railroad in Switzerland.

The Lauterbrunnen-Mürren railroad in Switzerland, which was opened about a year ago, is illustrated and described at some length in the *Schweizerische Bauzeitung* of August 13, 1892. The franchise for this line, which combines both cable traction and an electric trolley system in a most interesting manner, was awarded in 1887, and the work of construction was carried out by Messrs. Frey & Haag, the owners being the Lauterbrunnen-Mürren Mountain Railroad Company.

The cable section begins at the northern end of the village, Lauterbrunnen, and runs in a straight line up to the Grützsch Alp, the difference in elevation between the two stations being 2,211 ft. The electric section begins at Grützsch, at which passengers must change cars. The length of the cable line, measured on the incline, is 1,332 metres, or about 4,360 ft. Water ballast is used as the motive power, and the conditions imposed by the profile adopted were such that, in order to secure satisfactory operation, a gradual emptying of the water-ballast tanks had to be provided for during the runs. Owing to the unfavorable character of the ground, all cuts along the line had to be provided with masonry retaining walls, and the drains for the escaping water ballast had to be lined with *béton*.

The road is of the three-rail type, the central rail being used for both ascending and descending cars, ex-

*By Mr. A. M. Walt, Assistant Master Car Builder Lake Shore & Michigan Southern, Read at the September meeting of the Western Railway Club.

cept at the turnout at the middle of the section and at the Grützsch station, where, for a distance of about 130 ft., the road is of the ordinary double-track construction, the two tracks being about 8½ ft. apart, so as to make lateral guide rollers unnecessary for the cable leading from the main drum. The latter is about 12 ft. in diameter. There are also two Riegenbach safety racks. The cable is what has been termed a compound cable, made by the well known firm of Felten & Guilleaume. It consists of crucible steel wire of different gauges, the aim having been to equalize as much as possible the strain on the several wires. Idlers are placed at distances ranging from 13 to 16 metres (about 42 to 52 ft.). Each car has hand as well as automatic brakes, the latter coming into action in case of cable rupture or when, for any reason, a fixed rate of speed should be exceeded. The water ballast tanks underneath the cars hold about 2,000 gallons each. The cars are designed to accommodate about forty passengers, the maximum weight of carrying capacity being 3,000 kilog., or about 6,000 pounds. The available water ballast in a descending car without passengers is sufficient to raise the other car when carrying its full complement. At the side of each hand-brake, the drain-cock for the ballast tank is located so that the attendant has it within easy reach.

The water supply reservoir at the Grützsch station is of masonry and has a capacity of about 30,000 gallons. It is fed by springs through a 4,600 foot supply main. A float in the reservoir controls a shut-off valve on this main, so that when a certain water level has been reached the supply of water to the reservoir is stopped.

The electric section of the road, as previously stated begins at Grützsch,—the terminal of the cable line,—and leads to the hotel at Mürren, about two and three-fourths miles distant, the difference in elevation between the terminals being a little over 500 feet. The current is generated in a station near Grützsch, the primary power being furnished by a 120 H. P. turbine, built by Escher, Wyss & Co. The trolley wires are carried on wooden poles at a height of about sixteen feet above the tracks. Each train is made up of a motor car, a passenger car and a baggage car.

The grades on the cable section range from about 50 to 60 per cent. and on the electric section, from 0 to 5 per cent.

Cable Street Railroads.

A somewhat lengthy account of cable street railroads is given in the *Zeitschrift of the Austrian Engineer and Architects' Society*, of July 22, 1892, by E. A. Ziffer, in which the general as well as some of the detail features of construction, working costs and advantages of cable traction systems, and other matters of allied interest are taken up.

From the historical review which prefaces the article we take the appended brief particulars:

The idea of propelling surface cars by continuously moving cables, placed in underground conduits, connection between the cables and cars to be established by suitable gripping mechanism, was first advanced in the year 1845 by W. Brandling. In 1858, E. S. Gardner, of Philadelphia, suggested the use of the slotted underground conduit, in which the propelling cable was to move, though at that time no details were given of the cable gripping appliances with which, evidently, it was proposed to fit up the cars. A year later, in 1859, Foster and Brown proposed to employ an elevated, endless cable, and in 1863, C. F. Harvey brought forward a cable system, according to which the underground cable was to carry a series of discs which would catch a forked rod capable of being raised or lowered from the car on the surface. In the immediately succeeding years a large number of cable-road inventions were made, but few of them became known to any extent.

It was not till about 1869 or '70 that General Beauregard, of New Orleans, developed a practical cable-grip, and while this was primarily designed for use in connection with cables above ground it really led to the successful solution of the problem of making a serviceable underground grip. In 1872 Thompson secured a patent for the system of using yokes in the underground construction, the credit for practically applying which is evenly divided by Hallidie, Eppelsheimer, Root, Howey, Miller and Paine. To San Francisco belongs the credit of first having helped to develop the cable traction system on a relatively large scale, the Clay street line in that city being opened for traffic in September, 1873. In 1882 Raasmussen secured a number of patents for a new cable system, in which the motion of the cable was transmitted to the car through the intervention of a toothed wheel turning loosely on one of the car axles when the car was not in motion, but capable of being held stationary by a brake when it was desired that the car should go ahead. The cable, in this system, as in some of the others, carried a series of discs which caught in the teeth of the toothed wheel mentioned.

Outside of the United States, the first practical example of cable street railroad construction was found in New Zealand, where the towers of Roslyn and Dunedin were connected by a cable road by the engineers Reid and Duncan. This line was opened in 1882. The introduction of the cable system into Europe was due mainly to the efforts of Capt. H. F. Mills, the first application of the system being on the line of the Highgate Hill Tramway Co., at London, traffic on this being taken up in May, 1884. Following the London example, a cable road was installed at Edinburgh, and then at Birmingham, Melbourne and Sydney, in Australia; Braga and Lisbon, in Portugal; Constantinople and Hongkong are now all either equipped in part with cable roads or contemplate their early introduction. Paris also has a short single-track cable road with five turns, built last year.

Foreign Railroad Notes.

There will be two courses of railroad lectures at the Berlin University during the next winter semester, one on Prussian railroad law by Privy Councillor Gleim, and one on railroad operation, by Privy Engineer Councillor Oberbeck.

On a German railroad the enginemen have been ordered, when they see a man on the line, though he may have stepped off the track and out of the way of the train, to slow up so as to be able to stop quickly until they have passed the man. They and the trainmen are to endeavor to identify the man and if possible secure his arrest, that he may be punished for trespassing.

A bill making the time of the 18th meridian (Middle European Time), the legal time for all purposes throughout the German Empire is now under consideration by several committees of the German Confederate Council. It has been the railroad time for some months. Holland, which from its position should take Greenwich time, at the recent convention of the German Railroad Union announced its desire to use 15th meridian time, doubtless because its important railroad connections are with Germany.

On the Berlin Elevated Railroad the regulations forbid passengers to carry lighted cigars into the second-class cars. In September of last year a gentleman violated that rule, was arrested and fined. He appealed to a city magistrate and won his case, but the prosecuting attorney appealed and the case was tried. The passenger pleaded that such a regulation was an unreasonable limitation of personal liberty; smoking might be forbidden, but not carrying a lighted cigar, especially as the rules prohibited throwing away a lighted cigar in a station. But the court of appeals upheld the railroad regulation and the fine was confirmed.

On the first of July last there were 76 railroad managements in the German Railroad Union working in the aggregate 47,224 miles of railroad, of which 26,333 miles were in the German Empire, 16,782 miles in Austria-Hungary, 1,680 in Holland, 1,521 in Rumania, 433 in Belgium, 308 in Russian Poland, 103 in Luxembourg, and 65 miles in Bosnia (an Austrian protectorate). The bi-annual general convention of the Union was held in Hamburg early last August, and the Berlin Railroad Directory of the Prussian State Railroads was chosen as the chief executive for the fourth time.

The Trans-Caspian Railroad, of which we have heard so much, is not precisely a money-making enterprise. Its earnings have never been reported until this year, when during the month of January they amounted to \$108,092, or \$168 per mile of road, which, however, is nearly 40 per cent. more than last year. It is well to remember, however, that the road was not built to make money, but to secure communication with recently conquered provinces of the Russian Empire and an important military frontier. The railroad is worked, as it was built, by the army. It is 894 miles long, largely through a desert of sand.

The Hungarian grain and flour exporters, in conference with the State Railroad authorities concerning the probable demand for cars and the number available, intimated that the chief market, England, was largely closed to them by American competition; and thought that a reduction in the rail rates on exports of flour to that country would be advantageous, as has been a reduction on flour shipped to Brazil. But they declared that even if grain were carried to Flume, the Hungarian port on the Adriatic, free of charge, it could not compete with American grain. Hungary formerly had a great advantage in Brazil and other tropical countries because of the keeping qualities of its flour made from hard wheat by the roller process. But since we have adopted and improved the Hungarian roller mills, and opened the vast territory in Minnesota and Dakota where hard wheat is grown, it has to meet American competition in nearly all the tropical markets, and has difficulty in getting remunerative prices for its flour.

The French railroads in 1891 worked an average of 21,080 miles, which was 352 miles (1.7 per cent.) more than in 1890. Their gross earnings increased three per cent.; and their earnings per mile 1½ per cent., the latter reaching \$10,633.

The Orleans Railroad, of France, has recently introduced a new schedule of rates for the transportation of grain. The grain rates heretofore in force were the same for all quantities, but varied with the distances per ton of 2,200 lbs. per kilometre, being eight centimes per kilometre for 60 kilometres or less, five centimes for distances above 60 to 200 kilometres, four centimes for greater distances up to 314 kilometres, and 2½ centimes for greater distances; which reduced to our measurements makes 5½ cents per 100 lbs. for 37 miles, 12 cents for 124 miles, 16 for 195 miles, 27 for 500 miles, and 36 cents for 900 miles—but there are very few shipments as far as 300 miles on this company's lines.

The flour tariff is formed in a similar way, but is not the same, the rate of 8 centimes per ton applies for the first 100 kilometres instead of the first 60, the 5 centime rate for the second 100, a 3 centime rate for the third 100 and the 2½ centime rate per ton for all distances over 300. In both cases a terminal rate of 1½ francs per ton is charged.

The new tariff, which is not yet in force, but awaits government approval, puts grains, mill stuffs and potatoes in one tariff, at 6½ centimes per ton for the first 125

kilometres, 2 centimes for the second 125 kilometres and 1½ for distances over 250 kilometres and a terminal charge of 1 franc which is about 8½ cents per 100 lbs. for 78 miles, 10½ cents for 156 miles, 18 for 500 miles and 27 cents for 900 miles. The figures are not very different from rates charged on well known routes in this country. They are offered only for shipments of as much as 17,000 lbs. of grain and potatoes and 11,000 lbs. of flour and mill stuffs.

There have been so many abuses connected with the workmen's tickets issued at very low rates on the Prussian state railroads that an order has been issued recently directing that such tickets must not be issued hereafter without proof that the buyer is really a workingman, such as identification by the local police authorities, or presentation of the tickets of insurance for age and illness which under recent laws is compulsory for all workmen. It is directed, moreover, that such tickets shall be good only on certain trains, and at certain hours, suitable to the hours of labor of the places where used, and, as a rule, on trains running before 8 o'clock in the morning and after 4 o'clock in the afternoon.

In Russia last July a reduction of 75 per cent. was made in the charges for transportation of physicians, students, hospital stewards and nurses carried to districts suffering from cholera, and also on those for disinfectants.

Train Accidents in the United States in August.

COLLISIONS.

REAR.

2d, on Cleveland, Chicago & St. Louis, at Edwardsville, Ill., eastbound passenger train No. 12, running at high speed, ran over a misplaced switch and into some freight cars standing on a side track, wrecking four of them. The engine of the express train was overturned on to the Chicago & Alton track. The first 3 cars of the passenger train were ditched, the engineer and fireman were killed and a tramp badly injured.

5th, 11:30 p. m., on Lake Shore & Michigan Southern, at Harbor Creek, Pa., a westbound freight going into a side track to get out of the way of a following faster freight, was run into by the latter, making a wreck which blocked both main tracks. Immediately after eastbound passenger train No. 6, running at high speed, struck the obstruction, and the engine, baggage car and two passenger cars were badly wrecked; the engineer and fireman of this train were killed, but only a few passengers were injured; one sleeping car had its side entirely torn off.

7th, on Brooklyn, Bath & West End, at West Brooklyn, N. Y., a passenger train consisting of 6 cars which was being let down a grade under the control of hand brakes only, was allowed to go too fast and ran into the rear of a standing train, causing injury to several passengers. Many more jumped out because they were frightened, the cars being opened at the side, and 20 in all were injured.

9th, on Chicago & Erie, near Kingsland, Ind., an engine drawing a caboose ran into the rear of a preceding train of the same kind, which had stopped at the station for orders. The forward caboose was wrecked, and a man who was in it talking with the brakeman was injured.

13th, on Burlington & Missouri River, at Havelock, N. D., a freight train ran into the rear of a preceding freight, wrecking 2 carloads of cattle, several box cars and 1 engine. A conductor was injured.

14th, on Buffalo, Rochester & Pittsburgh, at Leroy, N. Y., an excursion train ran into the rear of a freight train which was entering side track, wrecking the caboose. The passenger engineer was injured by jumping.

15th, on Chicago, Rock Island & Pacific, near Chicago, a freight train which had been slackened, because of a delay to a train ahead of it, was run into at the rear by a following freight running at high speed. Several cars were wrecked and set afire, and the engine was badly damaged. A stock drover in the caboose was badly scalded by steam from the locomotive.

18th, on Boston & Maine at West Concord, N. H., a freight train broke in two and the two parts afterward ran together wrecking 10 cars of coal.

18th, on Chicago & North Western, at Otis, Ia., an eastbound passenger train ran over a misplaced switch and into some cars of coal standing on the siding, wrecking the engine and several cars. Engineer and fireman injured.

19th, on Chicago, St. Paul, Minneapolis & Omaha, at Prairie Junction, Minn., a freight train broke in two and the rear portion afterward ran into the front portion, wrecking 3 cars. A tramp stealing a ride was killed.

24th, on Boston & Albany, near McDonalds, Ga., a log train broke in two on a descending grade and the rear portion of the train ran back into the head of the following train, making a bad wreck. Engineer and 4 other trainmen injured.

26th, on New York & Long Branch, near Elizabethport, N. J., a peach train ran into a switching engine, wrecking engine and several cars. There was a dense fog at the time. One engineer was injured.

26th, on Schuylkill & Lehigh Valley, at Reading, Pa., a freight train which had been cut on a descending grade was not controlled, and the rear portion ran into the forward one, derailing several cars and killing a brakeman.

29th, on Baltimore & Ohio, at West Union, W. Va., a freight train which was standing at the station was run into at the rear by a following freight, wrecking 2 cars of sheep and overturning an engine. The engineer of the foremost train was under his engine when the collision occurred, and was run over and killed.

And 24 others on 17 roads involving 3 passenger and 37 freight and other trains.

BUTTING.

5th, on Chicago, Milwaukee & St. Paul, near Williamsburg, Ia., an engine and caboose ran into a work train, doing slight damage. The engineer of the latter reversed his engine and jumped off and the train ran backward about 10 miles, killing a cow and a horse in its course.

6th, 1 a. m., on Baltimore & Ohio, near Connellsburg, Pa., butting collision of freight trains, wrecking both engines and 5 cars. It is said that one of the trains was running contrary to a meeting order. Two brakemen were killed and 2 other trainmen injured.

8th, on Baltimore & Ohio, near Belaire, O., on the bridge over the Ohio River, butting collision between 2 yard engines, badly injuring 1 trainman and hurting 3

others less seriously. There was a dense fog at the time. It appears that the yard engines were in the habit of using the main track under regulations which were not very strict.

10th, on Illinois Central, near Cobden, Ill., a northbound passenger and a southbound freight train collided, wrecking both engines and 10 freight cars. A brakeman was killed and a tramp injured.

11th, on Cleveland, Cincinnati, Chicago & St. Louis, at Sidney, O., butting collision between a westbound passenger and an eastbound freight train, wrecking both engines. The mail car was thrown down a bank against a dwelling house. One fireman was killed and an engineer injured.

13th, on Southern Pacific, near Beaumont, Tex., butting collision of freight trains, running at high speed, wrecking both engines and 12 cars. One of the engineers read his order carelessly, the word "and" being omitted by him in consequence, according to his own story, of the same being covered by his thumb at the time he read the order. A portion of the wreck was burned up.

15th, on Nashville, Chattanooga & St. Louis, butting collision of engines, wrecking the tender of one of them. Two men were injured.

15th, on Illinois Central, near Carbon, Ia., butting collision between 2 work trains, badly wrecking both. One fireman and 5 laborers seriously injured.

17th, on Boston & Maine, near Prudis, Mass., butting collision between a passenger and a freight train, making a very bad wreck. The engineer and 1 brakeman of the freight were killed and 2 other trainmen were injured.

25th, on New York & New England, near Providence, R. I., butting collision between a passenger and a freight train, badly damaging both engines. Two passengers were injured.

27th, on Missouri Pacific, near Washington, Mo., butting collision between freight trains, wrecking both engines and 56 cars. The fireman and a tramp stealing a ride were killed, and 2 other trainmen and 1 other tramp were injured. It is said that a mistake of the train dispatcher in giving meeting orders was the cause of the collision.

28th, on Chicago, Rock Island & Pacific, near Horton, Kan., butting collision of freight trains. A brakeman was killed and both firemen badly injured. Misunderstanding of orders is said to have been the cause.

30th, on Central Vermont, near Williston, Vt., butting collision between an excursion train and a freight, causing the death of three passengers. It appears that the wreck was a bad one, but the first three cars of the passenger train were empty.

30th, on Pennsylvania road, at White Hill, N. J., butting collision between eastbound passenger train No. 312 and a westbound train of empty cars. Both trains were running at a good speed, and the wreck was a bad one. The conductor and engineer of the westbound train were killed and both baggage masters injured. The westbound train appears to have encroached on the time of the regular train.

And 10 others on 9 roads, involving 3 passenger and 17 freight and other trains.

CROSSING AND MISCELLANEOUS.

2d, on Lehigh Valley at Hokendauqua, Pa., a freight train backing out of a side track was run into by another freight train, wrecking one engine and several cars; one engineer was killed by jumping.

2d, 4 a. m., on New York & New England, at Osborn-town, Conn., a freight train pulling out of a side track was struck in the middle by another freight train moving in the same direction on the main track, wrecking 16 cars; one engineer was injured.

6th, 9 p. m., on Lake Shore & Michigan Southern at Ligonier, Ind., a fast passenger train run into an empty engine; the passenger engine was overturned and the engineer badly injured.

8th, at Peterboro, N. H., collision between a Boston & Maine switching engine and a Fitchburg freight train, injuring engineer and 1 fireman.

9th, on Northern Central in Baltimore, Md., a passenger train ran into a freight train which was switching on the main track, wrecking the engine and 1 freight car. A freight brakeman was killed.

11th, on Philadelphia & Reading, near Schuylkill Haven, Pa., collision between a passenger and a coal train, wrecking 20 coal cars. Two passengers and 2 trainmen injured.

12th, on New York Central & Hudson River, at Albion, N. Y., collision of freight trains, wrecking several cars and injuring a tramp.

12th, on Lehigh Valley, at Coxton, Pa., a freight train backed against another freight, striking it so violently that the engineer of the latter was thrown off his engine; he landed upon an adjoining track and was run over and killed by a freight train.

17th, on Cleveland & Pittsburgh, in Cleveland, O., a switching engine backed a caboose violently against some cars, doing considerable damage and badly injuring a conductor.

17th, 11 p. m., on Boston & Maine, at Contoocookville, N. H., heavily loaded coal train approached the station at uncontrollable speed, and, to avoid running into a building at the end of the track on which it was running, a switch was thrown, turning the train on to another track, where it wrecked an engine and 8 cars.

19th, on Chesapeake & Ohio, in Richmond, Va., a heavy freight train became uncontrollable on a descending grade and ran over a misplaced switch and struck another freight train standing on the side track. Engine and 8 cars wrecked. Engineer and 2 other trainmen injured.

25th, on Pennsylvania road, in Philadelphia, 3 cars of a switching coal train broke loose and ran down a grade into a portion of the same train, wrecking several cars and injuring 2 brakemen.

25th, on Chicago, Milwaukee & St. Paul near Sabula, Ia., collision between a freight and a work train, injuring 3 laborers.

26th, on Pennsylvania road, at Pittsburgh, Pa., a collision of passenger trains switching in the station resulted in the injury of 5 passengers.

26th, on Evansville & Terre Haute, near Farmersburg, Ind., there was a collision between trains which did slight damage; but it caused the engineer and fireman of one of the engines to abandon their engine, which then ran away uncontrolled. At Farmersburg it ran into a standing passenger train, doing considerable damage and injuring 1 passenger.

27th, on Central of New Jersey, near Laurel Run, Pa., a freight train ascending a steep grade was run into at the front end by a train of empty passenger cars which had run away unattended from a station above, making a very bad wreck. A brakeman was killed and 2 other trainmen injured. The passenger cars had started from

a side track at a picnic station, and it is said that the brakes were released by boys while the trainmen were attending to the engine.

And 16 others on 15 roads involving 3 passenger and 27 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

9th, on Atchison, Topeka & Santa Fe, at Petersburg, Col., a passenger train running at high speed was derailed by spreading of the rails, all the cars except 2 being thrown into the ditch. Eighteen passengers were injured.

10th, on Delaware, Lackawanna & Western, at North Bridgewater, N. Y., several cars of a freight train were derailed by a disconnected switch rod, the engine being overturned. The engineer was injured.

12th, on Columbus, Hocking Valley & Toledo, near Logan, O., freight train No. 63 was wrecked by the failure of a bridge, the engine and 17 cars falling into the river. Three trainmen were injured.

17th, on Ohio & Mississippi, near Riverside, O., a freight train of three cars and an engine was derailed by spreading of rails and the whole overturned in a deep ditch. One employee and boy stealing a ride were killed and 3 employees were injured.

25th, on Pittsburgh, Shenango & Lake Erie, near Dixenburg, Pa., an engine carrying bridge repairers over the road to look for damage from heavy rains broke through a trestle upon which it ran at a very slow speed. The engine fell into the stream and the conductor and foreman, who were on the front of the engine, were killed.

27th, on Minneapolis, St. Paul & Sault St. Marie near Barrett, Minn., 2 cars of a passenger train fell through a trestle bridge, causing the death of four passengers and the injury of 18. It is said that the trestle had been weakened by sudden freshet.

30th, on Northern Pacific, near Kendrick, Wash., the engine of a work train was derailed at a point where the track was in bad condition, and the engineer was injured.

And 3 others on 3 roads involving 1 passenger and 2 freight trains.

DEFECTS OF EQUIPMENT.

1st, on Cleveland, Cincinnati, Chicago & St. Louis, at Cold Spring, O., a freight train in which were several cars of naphtha was derailed by a broken drawbar, making a bad wreck. Several hours afterward while men were at work clearing the wreck fire broke out, and a naphtha tank exploded, burning some of the railroad men and bystanders.

7th, on Pennsylvania road, at New Brunswick, N. J., a west bound freight train, consisting principally of empty cars, was derailed just west of the bridge over the Raritan River by a broken truck. The train was running at considerable speed, and knocked down several signal posts, one bridge, a flagman's cabin and a tool house, the latter of which caught fire.

20th, on Annapolis & Baltimore Short Line, at the junction of the Baltimore & Ohio, near Baltimore, Md., the passenger car of a mixed train was derailed by a door which fell off a freight in the forward portion of the train. The passenger car was overturned and thrown down a high bank. A man and woman standing beside the track were killed, and 16 passengers were injured. The coroner's jury in reporting on the accident characterized the freight car as "dilapidated."

22d, on Pennsylvania road, at East New Brunswick, N. J., 2 cars of a west bound freight train were derailed by the breaking of the coupling, and they were pushed to one side so as to foul the adjoining track. An east bound freight train came along just at that time and pushed the wreckage along some distance, tearing out the sides of 16 cars.

25th, on Northern Central, near Williamsport, Pa., a locomotive descending a steep grade became disabled by the failure of the brake and was derailed and overturned. The engineer was killed and the fireman badly injured.

26th, on East Tennessee, Virginia & Georgia, near Wagar, Ala., the engine and several cars of a passenger train were derailed by the breaking of a driving wheel. The engineer was injured.

30th, on New York, Lake Erie & Western, at Waverly, N. Y., the engine of a Lehigh Valley stock train was derailed at a frog and badly damaged. It is said that the journal of one of the leading wheels had become highly heated, so that on violently striking the frog it was bent and finally broken off.

31st, on Philadelphia, Wilmington & Baltimore, near Newark, Del., 12 cars of a freight train were derailed and wrecked by the burning off of a journal.

And 10 others on 9 roads, involving 1 passenger and 9 freight and other trains.

NEGLIGENCE IN OPERATING.

1st, on West Shore road, near Lyons, N. Y., 8 empty cars in the rear of a long train were derailed by the sudden stoppage of the train owing to the automatic application of the air brake, due to the breakage of the car coupling next to the tender. There were 64 cars in the train, of which 41 were equipped with the air brake.

12th, on Chicago, Rock Island & Pacific at Twenty-second street, Chicago, a yard engine running southward was derailed by a misplaced switch and ran against a passenger train of the Lake Shore & Michigan Southern running southward, which in turn was pushed against a passenger train of the Chicago, Rock Island & Pacific running northward. Engineer and 3 other trainmen injured. One of the passenger cars was badly damaged, but there happened to be no passengers in that part of the car.

18th, on Atchison, Topeka & Santa Fe, in Denver, Colo., a passenger train was derailed by a misplaced switch, badly damaging the locomotive. Two trainmen were injured.

17th, on Milwaukee, Lake Shore & Western, at Greenville, Wis., a freight train was derailed by a misplaced switch and the engine and 6 cars went down a bank. The engineer was injured.

31st, on Central of New Jersey, at South Amboy, N. J., 10 cars of a coal train were derailed and wrecked by the sudden stoppage of the train at a grade crossing.

31st, 4 a. m., on Long Island road, at Fresh Pond, L. I., a locomotive was derailed while making a running switch and ran against a freight train passing on the adjoining main track, derailing about 30 cars.

And 20 others on 19 roads involving 7 passenger and 13 freight and other trains.

UNFORESEEN OBSTRUCTIONS.

2d, on New York, Lake Erie & Western, in Passaic, N. J., a freight train ran into an electric street car, killing the man in charge of it and derailing the engine and 6 cars of coal. The freight engine was at the rear of its train; a freight brakeman was slightly injured.

4th, 1 a. m., on Louisville, New Albany & Chicago, at

Broad Ripple, Ind., a passenger train was derailed by running over a bull which had fallen into a cattle guard, overturning the engine; the engineer was killed and the fireman injured.

5th, on Atchison, Topeka & Santa Fe, at Timpan, Col., a freight train was derailed at a washout and the engine and 8 cars wrecked; 2 trainmen were injured.

5th, on Texas & Pacific, at Brownlee Spur, Tex., a passenger train was derailed by running over a cow, the engine and first 2 cars being overturned. The fireman was injured.

10th, on Southern Pacific near Uvalde, Tex., the engine of a freight train was derailed by a sleeper floating on the water in a cut where the road was submerged. Several cars were derailed and one of them knocked down one span of the bridge over the Sabine River. The caboose fell about 40 ft. to the river. One brakeman was killed and 6 injured.

11th, on Louisville, New Orleans & Texas, near Natchez, Miss., a passenger train was derailed by running over a mile, 1 passenger car being overturned. One passenger and 2 trainmen were injured.

12th, on Marietta & North Georgia, near Ellijay, Ga., a freight train was derailed by running over a cow and the engine and 8 cars wrecked. The engineer and fireman were injured.

20th, on New York, Lake Erie & Western, near Linden, N. Y., the engine of westbound passenger train No. 1 was derailed while running at high speed by a bar of iron which had been maliciously fastened on the track. This was during the Buffalo strike.

20th, on East Tennessee, Virginia & Georgia, at Chauncey, Ga., the engine and 8 cars of freight train were derailed by running over a cow. The engineer was injured.

21st, on Pennsylvania & Northwestern, near Bellwood, Pa., a locomotive train was derailed and overturned by a large rock which had fallen on the track. Two men riding on the tender were killed and the engineer and fireman badly injured.

22d, 10 p. m., on New York, Central & Hudson River, at Suspension Bridge, N. Y., a car in a freight train was derailed by the malicious misplacing of a switch under a moving train, and the rear portion of the train was thrown upon the track leading to the Cantilever Bridge. At the entrance to the bridge is a gate the attendant of which was badly injured in trying to open it. The locality was invested with striking brakemen and their friends, and after the collision the gatekeeper's lantern was kicked out of his hands.

22d, on Union Pacific, at Crystal Lake, Col., the engine and baggage car of a passenger train were derailed and engine overturned. The fireman was killed. It is said that the derailment was caused by a maliciously misplaced switch.

22d, on Pennsylvania road, near Reading, Pa., the engine of a north bound passenger train, running about 40 miles an hour, was derailed by a timber which had been maliciously placed on the track.

27th, on Baltimore & Ohio, near Woodstock, Va., a freight train was derailed by running over a cow and the engine and several cars went down a high bank. The fireman was killed and 1 brakeman injured.

28th, on Northern Pacific, at Dubuque, Wash., a passenger train was derailed by a misplaced switch which is said had been tampered with, and the engine and baggage car were overturned. The engineer and fireman were injured.

30th, on Savannah, Americus & Montgomery, near Cordele, Ga., the engine of a freight train was derailed by running over a cow, and the engineer was badly injured.

And 12 others on 11 roads involving 5 passenger and 6 freight and other trains.

UNEXPLAINED.

6th, on East Tennessee, Virginia & Georgia at Witts Foundry, Tenn., a passenger train was derailed, causing the death of the engineer.

7th, on Norfolk & Western, near Norfolk, Va., a freight train was derailed, making a bad wreck; one brakeman was killed.

12th, on Chesapeake & Ohio, at Barbourville, Va., a freight train was derailed, 20 cars being thrown down a bank. A tramp in one of the cars was killed and 3 others were injured, and the fireman was badly hurt.

13th, on Chicago, Burlington & Quincy, at Peoria, Ill., a passenger train was derailed while running at high speed, the engine and tender being wrecked. The engineer was killed and a fireman injured. The smoking car was overturned but no passengers were injured.

17th, on St. Louis, Iron Mountain & Southern, at Walnut Ridge, Ark., a freight train was derailed making a bad wreck. A man stealing a ride was killed.

25th, on Philadelphia & Reading, in Philadelphia, the engine of a freight train was derailed, injuring a brakeman.

30th, on Kansas & Arkansas Valley road, near Fort Gibson, I. T., an east bound freight train was derailed, wrecking 16 carloads of wheat. A brakeman was badly injured.

30th, on Missouri Pacific, at Sweet Springs, Mo., an excursion train was derailed, 4 cars being badly damaged. The engineer was injured.

And 28 others on 22 roads involving 2 passenger and 26 freight and other trains.

OTHER ACCIDENTS.

6th, on St. Louis, Keokuk & Northwestern, near Keokuk, Ia., a car of a passenger train was badly damaged by rocks from a blast in a bluff near the road, which was fired just as the train came along. Two passengers were injured, one of them probably fatally.

9th, on New York, Lake Erie & Western, near Goshen, N. Y., a number of passengers in the second section of passenger train No. 1 were injured by broken glass in consequence of an explosion in a ledge adjoining the track just as the train passed.

18th, on Central of Georgia, in Atlanta, Ga., a switching engine was badly damaged by the explosion of its boiler. Five employees were injured.

21st, on St. Louis, Iron Mountain & Southern, at Memphis, Tenn., the engine of a freight train was wrecked by the explosion of its boiler, and the engineer and fireman killed.

And 4 others on 4 roads, involving three passenger and one freight.

Electric Railroad in Washington.

Fred E. Sander, of Seattle, and Frank C. Ross, of Tacoma, will build an electric railroad 40 miles in length, connecting Tacoma and Seattle. Mr. Ross will build from Tacoma to Sumner, nine miles, and Mr. Sander will build the balance of the line. The road will be operated for both freight and passenger business.



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At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particularly as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

In an article which appears on another page, Mr. E. B. Wall, Superintendent of Motive Power, Pennsylvania Lines, Southwest system, tells what he thinks the railroads ought to do in anticipation of probable legislation on safety appliances. We are not so confident as Mr. Wall is that a law will be enacted in the next session of Congress to compel the use of power brakes and automatic couplers. Indeed, it seems to us that each year of delay in enacting such a law makes it less probable, for it gives members of the Senate and House, and State and National commissioners more time to learn what railroad companies are doing without a law. It is an old but true story that they are making such progress in equipping with air brakes and vertical plane couplers as ought to satisfy a conservative man, who believes that "haste makes waste" in most affairs, and especially in a matter of such enormous magnitude. The advance has been healthy, and, considering that the appliances are but recently developed, very rapid. If not checked by unwise laws, it is sure to be more rapid in the future than it has been in the past. Therefore, we look for a spread of the disposition to keep hands off, and let the railroads work out these intricate problems on their own lines; and it is as a contribution to the solution of the problems that Mr. Wall's paper has its greatest value. It lays down the lines on which the railroads may prepare for the changes that are forced on them by the logic of circumstances, whatever Congress and the States may do.

The question of charging for interchanged freight cars by the day will probably come up once more at the meeting of the American Railway Association in New York on Oct. 12, and a prominent member of the Car Accountants' Association has sent us a communication on the subject, which we print in another column. Our correspondent puts the case none too strongly. The roads do, indeed, pool their cars, but do not pool the cost of providing and maintaining them. It is like agreeing to pool earnings, and then throwing away the figures and distributing the money by guesswork. The only difference, since last spring, in the aspect of this question is the proposition, made this summer by the Car Accountants' Association, for the adoption of a rate of one cent a day, to be used with the present mileage rate of 7½ mills a mile. By this plan the conservatives are to be conciliated by the full retention of the present plan, and a very small per diem charge is to be used as an experiment. The experiment of 1888 failed because the per diem charge was too large, and it is now hoped by the advocates of this idea that the rate proposed will be so small that roads suffering lessees will submit to them longer than they did before and thus let the new plan run long enough to have a fair trial. If we were to make a prediction we should say that this would hardly meet the approval of the American Railway Association. We want to see the per diem

principle succeed and shall be glad to have this or any other hopeful plan adopted, but the root difficulty is based on an important theory, notwithstanding the fact that it is generally regarded as a "condition" only, and that theory must be considered. It is that large lenders of cars often find it good business policy, at least temporarily, to lend cars for nothing. This principle ought to be recognized, if recognized at all, by some more business-like plan; but we cannot see that the change in the per diem rate from six cents (as proposed last spring) to one cent will help the matter any. It will cost just as much money in clerk-hire to count per diem at a cent a day as it did at 15 cents in 1888. An increase in office expenses is likely to frighten many roads who would be willing to try an experiment of this kind with a small number of cars. And there is a strong feeling that the solidity of the opposition to per diem at recent meetings of the American Railway Association indicates that the opponents do not care to be educated as to its advantages. The most unyielding objections to a per diem plan come from roads which borrow large numbers of cars for long periods of time and for business which is competitive, and which presumably yields too small a profit to warrant any avoidable expenditure. This being the case, a loss of hundreds, though small as compared with thousands, will still be regarded as too large to be put up with.

A report of the the annual meeting of the Master Car Painters' Association will be found in another column. The discussions in this association are never without interest to their superiors, including the general managers, but in the present report will be found a suggestion, somewhat novel, which will interest the traffic managers as well. It is that a road can make money by announcing, instead of "through cars to all points," however distant, "Fresh and clean cars every 200 miles." It will be admitted that this is a sensible idea. In fact it is carried out more or less in practice in a good many cases, though, in consequence of the universal custom of catering to the timid passenger, who dares not change cars when more than ten miles away from home, even if he has two hours in which to do it, the advertisements have come to remain practically silent on this point. This idea touches a matter which will assume importance next year, in the anticipated heavy traffic between the Atlantic seaboard and Chicago. While the first class travel will doubtless be very heavy, there will no doubt be a chance for the profitable cultivation of a somewhat different field, that which is generally thought of in connection with tourist sleeping cars. But no one wishes to ride for 28 hours in a tourist sleeper, and, in fact, as intimated by the painters, it is neither necessary nor desirable. The natural method of traveling from New York to Chicago, at an economical rate, is to take a day car from New York in the morning, and change to a sleeping car at Buffalo in the evening.

Locomotives Which Have Developed Over 1,000 Horse Power.

A correspondent asks for information as to the instances in which horse power exceeding 1,000 has been observed in locomotives. We append a list of recorded cases, which is, however, undoubtedly incomplete, as there must have been many cases in which 1,000 H. P. or more have been developed of which no records have been made.

During the tests of the Strong locomotive No. 444 a set of indicator cards was taken on the Northern Pacific June 24, 1887, with a train weighing 370 tons, exclusive of engine and tender, and at a speed of nearly 80 miles per hour. Six indicator cards taken during this test were reproduced in the *Railroad Gazette* of Sept. 16, 1887. The horse power shown by these diagrams is 1,369.3, 1,500.7, 1,587.5, 1,810.8, 1,505 and 1,617.3. This engine has 20 × 24-in. cylinders, 62-in. driving wheels and a total weight of 188,000 lbs., of which 90,000 lbs. is on the driving wheels. The speed at which the diagrams were taken corresponds to 826 revolutions a minute, or a piston speed of 1,304 ft. per minute.

In the test of locomotive No. 171 of the Central Railroad of New Jersey, of which an account was given in the *Railroad Gazette* of Aug. 17, 1888, 1,002 indicated horse power was developed at a speed of 65 miles an hour, or 924 revolutions. This locomotive is an eight-wheel passenger engine and has 18 × 24 cylinders, driving wheels 68 in. in diameter and a total weight of 94,500 lbs., of which 68,670 is on the driving wheels. The boiler pressure at the time the diagrams were taken was 143 lbs.

In the *Railroad Gazette* of March 29, 1890, some indicator cards, taken at high speed from a Worsell compound locomotive, were shown. This engine has 20 and 28 × 24 in. cylinders, and driving wheels 91½ in.

in diameter. The total weight of engine and train was 695,000 lbs. The recorded horse power at 75 miles an hour, with 175 lbs. boiler pressure, was 1,041.4, and at 85 miles an hour, with 170 lbs. boiler pressure, 1,068.6.

During the tests made by Mr. H. J. Small on the Southern Pacific, in the spring of 1891, indicator cards were taken from two 12-wheel Schenectady locomotives when they were developing over 1,000 H. P. The compound engine has 20 and 29 × 26-in. cylinders, driving wheels 51 in. in diameter, and a total weight of 189,000 lbs., of which 109,750 lbs. is on the driving wheels. With a pressure of 180 lbs. at a speed of 23.67 miles an hour, corresponding to 156 revolutions a minute, 1,000.1 H. P. was shown by the indicator diagrams. The simple engine has 19 × 24-in. cylinders, 69 in. driving wheels, and a total weight of 127,000 lbs., of which 101,500 lbs. is on the driving wheels. This engine developed 1,070.4 H. P., with a boiler pressure of 165 lbs., at a speed of 80 miles an hour, or 390 revolutions a minute, which corresponds to 1,560 ft. per minute piston speed.

In the tests made by Mr. D. L. Barnes on the Baltimore & Ohio, and of which an account was published in the *Railroad Gazette* in November, 1891, the highest observed horse power was 1,327.4 at a speed of 30 miles an hour. The engine is of the 10-wheel type and has 21 × 26 in. cylinders, driving wheels 62 in. in diameter, and a total weight of 133,000 lbs., of which 103,300 lbs. is on the driving wheels. As we have said, there have been, doubtless, many other cases in which more than 1,000 indicated horse power has been developed by a locomotive. In connection with the illustrations of the decapod locomotives used in the St. Clair tunnel, which were published in the *Railroad Gazette* of April 8, 1891, a list of exceptionally heavy locomotives was given, each one of which has very probably developed over 1,000 H. P. at times. The St. Clair tunnel locomotives would develop about 1,050 indicated horse power at 150 revolutions with a boiler pressure of 160 lbs. and a mean pressure of 65 lbs.

The instances which are particularly notable are one of the Southern Pacific tests and the Barnes tests on the Baltimore & Ohio, as 1,000 H. P. was exceeded at a comparatively low speed. In the other cases of exceptionally high horse power the speed was high. The power developed by the Strong locomotive, namely, 1,810.8, has not, we believe, been exceeded in any recorded case of locomotive performance.

The Texas Railroad Commission Decision and the Minnesota Case.

The recent decision of Judge McCormick, of the United States Circuit Court, declaring unconstitutional the Texas Railroad Commission Act, brought up prominently before the public again the case which the Chicago, Milwaukee & St. Paul Railroad carried to the Supreme Court of the United States, against the state of Minnesota, a few years ago, and which attracted much attention at the time. The Minnesota case was decided in March, 1890, the Court then holding, it will be remembered, that the Minnesota Act, which provided that the rates adopted by the Commission shall be final and conclusive as to what are equal and reasonable charges, and which did not admit of judicial inquiry as to the reasonableness of such rates, was in conflict with the Federal Constitution, as depriving the Chicago, Milwaukee & St. Paul of its property without due process of law, and of the equal protection of the laws.

The Texas legislature of course had this notable and unavoidable decision before it in constructing its own Railroad Commission Act, and evidently sought with great pains to obviate, in its enactment, the objections which the Supreme Court pointed out as fatal to the Minnesota Law. Among these objections the Court noted that the Act gave no opportunity to the companies affected by it to produce witnesses before the Commission on the question of the reasonableness of rates. The design of the Texas legislators appears to have been to satisfy these requirements in form, but in substance to grant to their commission the same arbitrary power that was bestowed by the Minnesota Act. The result of this effort appears in the Texas law in the following terms:

"Sec. 4. Before any rates shall be established under this act the Commission shall give the railroad company to be affected thereby ten days' notice of the time and place when and where the rates shall be fixed, and said railroad company shall be entitled to be heard at such time and place, to the end that justice may be done; and it shall have process to enforce the attendance of witnesses. All process herein provided for shall be served as in civil cases."

"(a) The Commission shall have power to adopt rules to govern its proceedings and to regulate the mode and manner of all investigations and hearings of railroad companies and other parties before it in the establishment of rates, orders, charges and other acts required of it under this law, provided

no person desiring to be present at any such investigations by Commission shall be denied admission.

"(b) The Chairman and each of the Commissioners, for the purposes mentioned in this act shall have power to administer all oaths, certify to all official acts, and to compel the attendance of witnesses and the production of papers, way bills, books, accounts, documents and testimony, and to punish for contempt as fully as is provided by law for the district or county court."

The Minnesota Act provided that in case the Commission should at any time find that the rates which the companies were required to publish were in any respect unequal or unreasonable, the Commission had the power, and was directed, to compel any common carrier to change them and adopt such rates as the Commission should declare to be equal and reasonable. The common carrier was to receive notice of these rates, and if after ten days it failed to publish and adopt them as the prevailing rates, the Commission was authorized to have them posted at all regular stations along the line of the carrier; and to charge a higher or lower rate was declared to be unlawful. And in case of disobedience of the orders of the Commission, that body was entitled to writs of mandamus requiring compliance, and of injunction forbidding transportation until compliance, with costs including counsel fees.

The Supreme Court of Minnesota held that the only issue that could be raised by these writs was whether the mandates of the Commission had been disobeyed, and that the courts had no power to consider the question whether the rates established by the Commission were reasonable or not, or otherwise inquire into that matter, upon which the finding of the Commission was conclusive.

The United States Supreme Court assumed that this construction of the Act was correct. Under such construction it would be competent at any time for the Commission to fix rates so low as to make the carrier's property useless and to result practically in confiscation. This, therefore, vested the Commission substantially with the power to deprive the carrier of its property without due process of law, and of the equal protection of the law, seeing that other persons were permitted to receive reasonable profits from their investments. Any act, state or federal, which admitted of any such construction was in conflict with the national constitution, and so the elaborate enactment of Minnesota fell to the ground.

It will be observed that the gist of the objection to the Act was that the carrier had no adequate opportunity to be heard on a matter of vital importance to its property rights. In the language of the lawyers, it did not have, under this act "its day in court," nor right of process to summon witnesses, or to produce testimony, nor even the sad consolation of counsel. To preserve in their proposed act the semblance of these rights, so ancient that their origin is almost lost in the night of time, but to paralyze the vitality thereof, was the difficult task set before those Texas legal luminaries by her Legislature. How far they have succeeded has now passed from the domain of speculation to the realm of certainty, fixed by judicial sentence in a court of first resort. Texas, however, still has a chance of showing, if she can, to the satisfaction of the final court of appeal, that her Act does not invade the time honored principles to which we have adverted, but gives to the carrier the full benefit of a fair trial of the questions affecting his rights.

Upon an examination of Section 4 of the Act, around which the fight rages, one's first impression is that the Act, while loosely drawn was designed in good faith to provide a fair opportunity for the carrier to be heard under such reasonable rules of practice and procedure as justice and dispatch of business might require in the honest judgment of the Commission. And, indeed, it is quite possible, under this section, for the Commission so to discharge its functions as not to invade any principle of natural justice or of the Federal Constitution. But the real inquiry is not what a Commission, benevolent and patriotic if you choose, may do, but what any Commission, of any mental, moral or political make-up, can do, under a reasonable construction of the act. Had we not in mind the political issues in Texas, in which it appeared that a majority of the people were bent upon a course that contravened the rights of the railroad companies, we might read this Act, not only without suspicion, but even with satisfaction. But apprehension of unfairness reads between, as well as along, the lines, and a close scrutiny discloses that the only restriction upon the powers of the Commission in adopting "rules to govern its proceedings and to regulate the mode and manner of all investigations and hearings of railroad companies and other parties before it in the establishment of rates, orders, charges and other acts required of it under this law," is that "no person desiring to be present at any such investigation by the Commission shall be denied admission."

We might have been content with the provision that before any rate should be established the Commission should give the carrier ten days' notice of the time and place when and where the rates shall be fixed, understanding thereby, of course, that no rates would be fixed without full opportunity of the carrier to be heard. Though that is not the absolute or even necessary inference to be drawn, still it is perhaps a natural one, and it is a cardinal principle of construction that the natural meaning of words must be taken, and a good rather than an evil intent, must be imputed. But what are we to understand by the solitary restriction upon the powers of the Commission—a restriction that is significant because valueless? For of what avail to the carrier is the bare privilege—and it may come to that—of being a helpless eye-witness to its own grievous wrong? It is quite possible for the section to be so construed as to vest the Commission with power to fix rates after giving the carrier the notice required, but without regard to the evidence offered by the Commission, and under the substantially unlimited powers conferred, even without allowing adequately any evidence at all. That this is true is shown by the proceedings of the first and only Commission appointed under the Act; for it appears that, after giving a notice which stated that at such a time and place they would proceed to fix rates, the Commission fixed rates accordingly. The meeting was characterized by one counsel as "a sort of general experience meeting," and by another as "a kind of Chautauqua class, where free lectures on the general subject of railroad freights, etc., were invited from all comers."

No machinery was provided for the orderly conduct of business, and no procedure laid down or followed for bringing the parties interested into court. No attempt appears to have been made on any sensible basis to hear the allegations and proofs of parties, or to dispose of questions after they had been raised and evidence adduced by either side. The railroad companies were simply invited to witness a spectacle in which they were deeply concerned, and upon which they appear to have been allowed to make comments from time to time without offense, as from the galleries while the play was going on.

We should have little difficulty in concluding that this Act was fatally defective if the remedies of the carrier were confined to Section 4 quoted in full above. But such is not the case. The orders of the Commission may be reached, as we have seen, under the Act, without giving the carrier an opportunity to be heard before the Commission. But is that essential to the rights of the carrier if it has the right of a judicial investigation into the justice of the Commission's rulings, and an opportunity to show their injustice after they have been made? This right is expressly reserved to the carrier by Section 6 of the Act, whereby if it is not satisfied with the decision of the Commission, the carrier may file his petition against the Commission in a court of competent jurisdiction in the county where the capital of the state is located, setting up the particular objections to such decision. Such an action would, so far as appears, afford opportunity to determine judicially the reasonableness of the rates established by the Commission. But its force is weakened, if not destroyed, by section 5, which prescribes that the rates established by the Commission, though they may be thus the subject of investigation, shall prevail until found otherwise in the action described. There is no provision for a stay in the enforcement of the orders of the Commission pending the controversy. Here, then, before the carrier, protesting against the justice of a decision, can bring his appeal to a hearing, he is obliged to submit to the very wrong his appeal questions. There being but one county in the entire state provided for the hearing of these actions, the calendars of the courts would likely be crowded before final decisions are reached, and, adding to this the time that would probably be consumed in disposing of each of such actions, a delay might arise so ruinous as practically to deprive the carrier of the questionable benefit of the proceeding.

Now, the right to a hearing given after the decision of the Commission is doubtless as substantial as one given before, provided the decision is not enforced pending the hearing, whether the rates established by such decision are declared to be presumptively or conclusively reasonable, in the meantime. In this respect the Texas Act limps badly. The judicial investigation of what is reasonable, referred to in the Minnesota case as the right of the carrier, we apprehend, must be adequate, and an evident sham or even a thickly veiled one would hardly meet the requirements of the situation.

Whether the scheme proposed by the Texas Legislature will be finally upheld is of course yet uncertain,

but certainly this branch of it did not receive that attention at the hands of Judge McCormick which its importance seemed to require. We look forward to the ultimate disposition of this matter with the confidence that the Supreme Court will view the question from every side and render its decision with due regard to justice and the magnitude of the interests involved.

August Accidents.

Our record of train accidents in August, given in this number, includes 94 collisions, 119 derailments and 8 other accidents, a total of 221 accidents, in which 50 persons were killed and 213 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

	Rear.	But-	Crossing	Tot'l.
COLLISIONS:				
Trains breaking in two.....	9	..	1	10
Misplaced switch.....	3	..	3	6
Failure to give or observe signal.....	11	1	..	12
Mistake in giving or understand- ing orders.....	..	7	..	7
Miscellaneous.....	5	4	7	16
Unexplained.....	10	12	21	43
Total.....	36	21	32	91

	DERAILMENTS:			
Loose or spread rail.....	4	Track repai'res.....	1	
Defective bridge.....	3	Derailing switch.....	3	
Defective switch.....	2	Bad loading.....	1	
Bad track.....	1	Bad switching.....	1	
Broken wheel.....	1	Slack taken up too sud- denly.....	2	
Broken axle.....	1	Animals on track.....	3	
Broken truck.....	1	Landslide.....	3	
Fallen brakebeam.....	1	Washout.....	2	
Failure of coupling or drawbar.....	4	Malicious obstruction.....	3	
Broken car.....	2	Maliciously misplaced switch.....	1	
Breakage of brake rigging.....	1	Accidental obstruction.....	3	
Loose door.....	1	Unexplained.....	37	
Misplaced switch.....	15	Total.....	119	

	OTHER ACCIDENTS:			
Boiler explosion.....	..			2
Broken side rods.....	..			2
Cars burned while running.....	..			1
Various breakages of rolling stock.....	..			2
Other causes.....	..			8

Total number of accidents..... 221

A general classification shows:

	COL- LISIONS.	DERAIL- MENTS.	OTHER ACC'D'TS.	TOT'L. P.C.
Defects of road.....	1	10	..	11
Defects of equipment.....	10	18	5	33
Negligence in operating.....	40	26	5	67
Unforeseen obstructions.....	..	28	2	31
Unexplained.....	43	37	..	80
Total.....	91	119	8	221

The number of trains involved is as follows:

	COL- LISIONS.	DERAIL- MENTS.	OTHER ACC'D'TS.	TOT'L.
Passenger.....	29	34	8	61
Freight and other.....	144	87	3	234
Total.....	173	121	8	302

The casualties may be divided as follows:

	COL- LISIONS.	DERAIL- MENTS.	OTHER ACC'D'TS.	TOT'L.
KILLED:				
Employés.....	20	13	3	35
Passengers.....	3	4	1	8
Others.....	2	5	..	7
Total.....	25	22	3	30

	INJURED:			
Employés.....	51	48	5	104
Passengers.....	27	61	11	99
Others.....	5	5	..	10
Total.....	83	114	16	213

The casualties to passengers and employés, when divided according to classes of causes, appear as follows:

	PAS- SENGER.	EMP. LOYÉ.											
Defects of road.....	9	16	2	3	8	1
Defects of equipment.....	3	13	..	3
Negligence in operating.....	3	40	29	29	22	13
Unforeseen obstructions and malice.....	1	12	6	24
Unexplained.....	..	13	3	5
Total.....	8	90	35	104

Thirty-four accidents caused the death of one or more persons each, and 47 caused injury but not death, leaving 110 (53 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with August of the previous five years shows:

	1892.	1891.	1890.	1889.	1888.	1887.
Collisions.....	91	111	83	81	68	65
Derailments.....	119	110	82	82	121	64
Other accidents.....	8	2	11	6	13	8
Total.....	221	223	178	169	228	157

	EMPLOYÉS KILLED.	EMPLOYÉS INJURED.	OTHERS KILLED.	OTHERS INJURED.	PASSENGERS KILLED.	PASSENGERS INJURED.
Employés killed.....	35	36	25	23	13	24
Employés injured.....	15	16	25	23	13	24
Others killed.....	10	15	10	12	10	10
Others injured.....	10	16	9	13	10	10
Pasenger trains involved	68	92	66	65	77	51

Average per day :

Accidents.....	7.13	7.19	5.74	5.45	7.16	4.42
Killed.....	1.01					

anything that had ever been known in that region before. There was another bad bridge disaster at Logan, O., on the 12th. The Keokuk accident was one of a pair, of a quite unusual kind, which occurred nearly at the same time. Two other causes which are somewhat unusual appear in this month's record. On the 30th and again on the 31st we have reports of derailments, one of them bad, caused by the heating of a journal. No doubt accidents reported as due to broken journals are often partly caused by the carelessness of trainmen in allowing them to become heated, but in these cases the reports happened to give the particulars, so that we are able to state the cause correctly. Two quite serious derailments were caused at derailing switches. We have had to class these by themselves for the reason that we could not tell whether the fault was chargeable to the engineman for disregarding the signal, or to the signalman for throwing the switch after it was too late for the engineman to obey the signal. On the 1st and on the 31st we have cases in which parts of freight trains were derailed by the too sudden application of the air brake. In one case the power brake was in use only on a part of the cars; in the other this point is not clear, but the fault seems to be chargeable to the engineman. In either case the damage is properly chargeable to "negligence in operating," but it is not always clear in these cases whether the fault is on the train or in the superintendent's office. If a train with apparently sound couplings and perfect air brake apparatus breaks in two, and a derailment occurs in consequence of the separation, the trainmen may not be at fault. Even where an engineman derails cars by applying the brake too suddenly his fault may not be great; it depends on the magnitude of the danger ahead, as estimated by him.

The collision at Prides, Mass., on the 17th, which resulted in the death of two trainmen, was due to lax discipline. The man in charge of the freight train was a brakeman, who testified that he trusted everything to the engineer. He had not looked up the running time of the passenger train. This and the collision near Beaumont, Tex., on the 13th, again illustrate one of the worst inconsistencies in American railroad operation. Theoretically two men are jointly and severally responsible for the safe handling of every train, and the alleged fact that two men have been appointed to attend to the duty is relied upon by the superintendent, in case of any trouble, to justify the completeness of his plans; but practically we may often find trains in charge of one well-qualified and one unqualified man; and the superior officer knows it. He is justly chargeable with this knowledge even if his worst fault, in his own estimation, is negligence in not closely watching what his assistants do. It is his duty to watch those assistants enough to post himself in sufficient detail about the state of discipline, or else resign. If anyone thinks this standard of requirements too high, he should reflect that sometimes the evil is worse than in the cases here cited; every now and then a train turns out to be manned by two men, both unqualified.

Besides several diabolical train wrecks in connection with the strike at Buffalo, one of which derailed a fast passenger train, there was a bold attempt near Reading, Pa., on the 22nd, which, however, did no great harm. Near Enon, Pa., on the night of the 26th, a train was stopped on account of obstructions on the track, and the circumstances were telegraphed all over the country, but it turned out that the alleged discoverer of the obstruction had placed it on the track himself with the hope of obtaining a reward.

There is one electric street-car accident in our list (at Passaic, N. J., on the 2nd); and we have accounts of six accidents, to or by electric cars, which are not railroad accidents in the sense in which we use the term. These occurred at Paterson, N. J.; Lawrence, Mass.; Denver, Colorado Springs, Syracuse and Canton, O. Three passengers were killed and 28 injured by these accidents.

One of the peculiar difficulties of operating American railroads is that of preventing malicious wrecks. In the more thickly settled countries of Europe the provisions for keeping people off from the railroad tracks or for detecting those who interfere with railroad property are more complete than they can possibly be in many parts of our own country, and than they actually are in most parts. On the other hand, in Mexico, where it is not easy to guard the long lines of railroad running through a country thinly settled with an almost barbarous population, the law makes it terrible to interfere with railroad trains. In the United States, however, we have so far made but feeble efforts to secure the protection of high civilization or of summary laws. Month after month and year after year we have to record a sad number of malicious wrecks. A year ago 22 persons were killed by a disaster of this kind at Statesville, N. C. The perpetrators in most of these cases are never discovered, or, if caught, are not satisfactorily convicted. One of the worst of these cases that has recently happened was the derailment of an express train on the Atchison, Topeka & Santa Fe, in Kansas, by train robbers in which four persons were killed and over 20 injured, as noted in our last issue. Such a crime can only be met by the extreme rigor of Mexican justice, and the perpetrators, if caught, should receive the death penalty with promptness. Probably

lynching does not pay in the long run; otherwise, we should say lynch them, by all means. But for the railroad companies this matter of train robbery in the Southwest is serious, and obviously it can only be ended by most energetic and united measures on their part. It would seem as if their policy should be to "get together" and provide an adequate fund to offer large rewards and to hire competent men who will make life a burden to every trainwrecker, or train robber as long as he lives. It seems as if a remorseless and never-ending pursuit of every such case would, before long, discourage the practitioners of the industry; and until the industry ceases the effect on the passenger business of the Southwestern railroads must be somewhat serious. In fact, a person going through to the Pacific coast would be quite justified in taking the northern routes for the purpose of escaping train robbers, if for no other reason. Unfortunately, this class of passenger traffic is so small a percentage of the whole that the railroads do not really feel the loss due to the desire of passengers to avoid a danger which should be entirely apart from railroad travel.

"The Buffalo Strike" is the title of an article in the *North American Review* for October by Theodore Voorhees, General Superintendent of the New York Central. Mr. Voorhees clearly states the conditions before the strike. The wages of the yard men were raised in 1888 to rates higher than any paid elsewhere in the state of New York, but not so high as those paid at Chicago. The Lake Shore and the "Nickel Plate," which have yards in both Chicago and Buffalo, have for sometime paid a little more than the Buffalo rate (of 1888), but about 10 per cent. less than the Chicago rate, and the Delaware, Lackawanna & Western pays the same as these. The object of the strikers was to make the roads entering Buffalo from the east pay as high as those entering from the west. The men worked 11 hours a day. On the advent of the 10-hour law, May 20, the roads divided the monthly wages by the number of hours actually worked in a month, and paid the men by the hour, thus leaving the pay unchanged, but disappointing the men in their hope that a "10-hour day" would result in a 10 per cent. increase of wages. The men presented petitions June 11 and "but little more was heard of the matter" until the strike, Aug. 12. In explaining the need for the militia, Mr. Voorhees says that of the 24,000 acres embraced in the limits of Buffalo, 6,400 are railroad property. Of the total assessed valuation, 170½ millions, the railroads are assessed 19 millions. Mr. Voorhees says that switchmen's work is not skilled labor; and he remarks incidentally that any man of average intelligence, with but a few days' instruction, is competent to fill the position of passenger brakeman. On the main facts, this paper tells nothing further that is new, though it is well worth reading because Mr. Voorhees is such a clear writer. While agreeing with other authorities that arbitration with irresponsible bodies of men can never be successful, Mr. Voorhees makes an exception of the Brotherhood of Locomotive Engineers, with whom "arbitration can be safely resorted to, because the rank and file can be depended upon" to sustain their leaders. A strong plea is made for the establishment of insurance and superannuation funds by American railroads, the example of the English roads being cited, and he rightly praises the "relief" systems of the Baltimore & Ohio and other American roads. The extension of these, especially in the superannuation feature, is the only suggestion Mr. Voorhees makes for the amelioration of the relations between railroad companies and their men.

We commend the abstract from the address of President J. N. Beckley, before the Street Railway Association of the State of New York, which is published in another column, to the attention of managers of suburban steam railroads, which are daily coming more and more into direct competition with electric railroads. It is probably generally true that the railroad, whether operated by horses, electricity or steam, which makes the greatest effort to accommodate its patrons, does the largest business, other things being equal. In some cases a steam railroad has enjoyed a monopoly of the suburban business in certain directions for years, because it would not pay to parallel it. But now, when connecting street railroads are being combined, and electricity can be so cheaply substituted for horses, where overhead wires are permitted, and speeds of 25 miles an hour are not uncommon, former horse railroads are coming directly into competition with steam railroads for suburban business, and are making their presence felt. It therefore behoves managers of suburban steam lines to watch the progress of suburban electric lines, and to see that their passenger equipment and train service are kept up to a point from which comparisons need not be feared.

We had thought of congratulating the Mexican railroads on the facility with which they were able to form a pool, free from governmental interference, but we are glad we didn't. A press dispatch reports that the Chamber Commerce of the City of Mexico has complained to the Department of Public Works protesting against the pool. The Chamber urges that the agreement be declared illegal, and that all freights paid under the

new rates in excess of the former rates shall be returned to importers, and the new rates be declared null and void. The Chamber bases its claims on the unconstitutionality of monopolies, and on the failure of the roads to give the department the proper notice of thirty days, as required by law in case of an advance in rates. A later dispatch reports that the President of the Republic agrees with the merchants' views, and has notified the roads that he will proceed against them if they do not restore the old tariffs. There are no files on the Mexicans, even if they are a few miles out of the centre of the business world.

The announcement of the annual meeting of the American Society of Railroad Superintendents appears in another column. The list of subjects to come before the meeting is an interesting one, and they will doubtless prove profitable to those who attend. The report of the special committee on signaling ought to be particularly valuable, as it is in the hands of well qualified men, and the subject affords an unlimited field for instructive discussion. Of the six topics enumerated under the last head, three are practically outside of the superintendents' field, but at this meeting the Society will be favored for the first time with delegates from the mechanical Associations; and it is possible that these subjects are made prominent out of compliment to these delegates. The mechanical men will no doubt be well qualified to give the superintendents the summarized results of the discussions on these subjects in their own Associations. The three topics which do belong to the superintendents will, however, with the rest of the program, afford sufficient material for a two days' meeting.

We have noted in previous issues (pages 662 and 663) the fact that a preliminary agreement has been made by the Northern Steamship Co. (an auxiliary of the Great Northern Railway Co.) with the Globe Iron Works, of Cleveland, to build two passenger steamers for service between Buffalo and Superior. These vessels are to have the following dimensions: Length of keel, 300 ft.; length over all, 380 ft.; beam, 44 ft., and their engines will be required to develop 6,000 H. P. The statements that have come to us are, that it is proposed to run these steamers through in 50 hours, which will require a maximum speed of something like 20 miles an hour. Whether or not this intention will be carried out, it is too early to say, but in any event the departure is an interesting one, and it may result in the development of a very important passenger business on the lakes, which, indeed, is not unimportant now.

How strictly people are forbidden to trespass on railroad tracks in Germany may be inferred by a recent decision of a Prussian court. Two employés of the tax office found it more convenient to go from a train to a factory, where they had duties, by crossing tracks in a station at a place other than that prescribed for the use of passengers. Complaint was made and they justified themselves by showing that employés of the tax office have the right to cross tracks in the performance of their duty. But the court held that this right can be exercised only when the duty to be performed requires it, as in following poachers or examining taxable goods on trains. To cross as a mere convenience is no more permitted to the tax office than to the general public. Small fines and one day's imprisonment were imposed on the trespassers.

The passenger department of the Pennsylvania has decided to publish circulars and time-tables in the French, German, Italian, Spanish, Swedish and Portuguese languages, for free distribution in Europe and South America. It is the purpose of the company to prosecute this plan energetically from now until the time of the World's Fair, and it is quite likely to be continued in some shape as a permanent thing. The Pennsylvania, not along ago, appointed Mr. J. L. Taylor European Passenger Agent at London, and it now also has a general South American Passenger Agent, Mr. E. I. Roller, whose office is at Rio Janeiro.

An esteemed Chicago contemporary published in its issue of Sept. 24 some conclusions on the subject of the substitutions of electric motors for steam locomotives which it credits to Mr. Arthur F. Woods and the *Mechanical World*. The article referred to is doubtless one written by Mr. A. T. Woods, for the *Railroad Gazette*, and published in our issue of June 24. We are, of course, highly complimented by having contributions to our columns so generally copied by other journals, but our contemporary might have given this paragraph to its readers and credit to the *Railroad Gazette* nearly three months ago.

The latest phase of the smoke question in Chicago is an agreement which provides that the towing companies are to begin to use anthracite coal or an approved quality of coke on all of their tugs within two weeks, and to continue to use such fuel for the remainder of the year 1892. Cases against the companies which sign the agreement are to be continued, and will be dismissed if they comply with this arrangement. It has already been signed by a majority of the owners. Several cases against railroad companies were settled last week by fines of \$5 and costs on each case reported.

NEW PUBLICATIONS.

The Journal of the Iron and Steel Institute. 1892. London: E. & F. N. Spon. This issue of the "Journal" has 562 handsomely printed octavo pages, with an excellent index. The valuable papers which it contains can only be mentioned. Besides the address of the President, Sir Frederick Abel, there are papers on Experiments with Basic Steel; on the Production of Pure Iron and Steel; on the Elimination of Sulphur from Iron; on Chilled Cast Iron (Gruson's system); on Platinum Pyrometers, and on two or three other subjects. The discussions of these papers are by no means the least valuable part. As those who are acquainted with the annual publications of the Institute know very well, one of its most valuable features is the summary, in short notes, of progress in the iron and steel industries; these fill 288 pages, and make an admirable book of reference. Three pages are devoted to a list of the principal works relating to iron and steel published during the first half of 1892.

Institution of Mechanical Engineers (London). Proceedings for May, 1892—This issue contains the President's address, showing the progress and present state of the Institution and some of the directions of present mechanical progress. There is also a paper on Marine Engine Trials, from the Research Committee on that subject. This is a document of over 60 pages, with illustrations. Another paper is on Initial Condensation in Steam Engines, by Lieut.-Col. Thomas English.

TRADE CATALOGUES.

Graphite for Lubricating—The Joseph Dixon Crucible Company, Jersey City, N. J., has published a little pamphlet on the use of graphite as a lubricant which contains considerable useful information.

The Commerce of the Great Lakes and of the Mississippi River.

Part II. of the Treasury Department Report on the Internal Commerce of the United States has just appeared. It treats of the commerce of the great lakes, the Mississippi River and its tributaries. Mr. Brock, Chief of the Bureau of Statistics, says in his introduction to the report: "There has probably been no time in the history of our country when there has been so much inquiry with reference to its internal commerce and its industrial progress as there is at the present time." And there are few subjects that reward inquiry by figures so startling, whether regard is had to their absolute or their relative amount. Aside from the deprecated stimulus to national vanity these studies are valuable as indicating where national and private expenditures can be made with profit to the government or corporation making them. It is gratifying to know that on the great lakes, with a total water surface of 95,275 square miles and a combined length, in this country, of 3,075 miles, the vessel tonnage passing Detroit, in 1890, "was over 8,000,000 tons in excess of the entrances and clearances at the port of London, and about double that of Liverpool and nearly equal to the two combined;" and that the ton mileage on the lakes is equal to about one-fourth the aggregate ton mileage of all our railroads. But it is of value to know that the estimated saving of lake transportation over the cost of railroad transportation was for one year \$135,000,000, which was secured by a total expenditure of \$37,247,993 by the general government.

The Mississippi, although it presents, with its tributaries, about 15,000 miles of navigable streams, is not at present showing such large direct gains for the money expended on it. This may be due in part to the fact that there is no available body of statistics showing even the trade on the Mississippi, but it is largely due to fluctuations in the depth of water, and to the fact that while deep water boats are not available during the season of low river, the boats of light draft are not economical when there is a good stage of water in the rivers. These variations in navigable depth are possibly larger and more trying to navigation than is generally supposed. During 1890 there were 76 days from May 1, during which from 10 to 15 feet were available below St. Louis, but from Aug. 10 there were 143 days in which the depth varied between five and six feet. In good water a single tow will convey 10,000 tons of cargo from St. Louis to New Orleans in six days, but boats employed in such service must be about useless during low water.

Under these adverse circumstances, in addition to the competition of the railroads, the enrolled tonnage on the Western rivers shows a marked decline from 1880 to 1890; but as, for several years, enrolling unrigged craft has been optional with owners, the figures presented have but little value for comparison. The character and value of the vessels, however, has changed greatly. The number of splendid passenger steamers has decreased and now 93.75 per cent. of the total is tonnage of low grade.

On the lakes there has been no diminution in the vessel tonnage or decrease in its grade. Stimulated by the demands of an increasing commerce Cleveland now ranks second only to the Clyde as a shipbuilding port, and the increased value of the lake marine for five years is returned as \$26,457,300. Now it is proposed to build two large and fast passenger boats as pioneers in a line be-

tween Duluth and Buffalo, so that the lakes, which have long been a source of trouble and perplexity to freight agents, are likely to have an influence on the contemplations of the general passenger agent.

Precautions Against Cholera on German Railroads.

The Department of the Interior of the German Empire has issued directions for preventing the spread of cholera, of which the following relate to the railroads:

Certain stations are to be selected where medical attendance and isolated apartments will be provided for passengers found sick, and where the cars occupied by such passengers can be set out of the trains and disinfected. The governments of the different countries will see that no hindrance be placed in the way of receiving patients at those stations where there are suitable hospitals. The soiled linen of such sleeping cars as arrive from places where there is cholera, or which have taken passengers at such places, must be disinfected at the terminal stations.

At places where there is special danger, such as the border of an infected country, and where the nature or origin of the objects carried are especially suspicious carriage of emigrants, shipments from infected places, it may be advisable to have a thorough medical inspection of the passengers and their baggage, and enforce the disinfection of the latter.

It is not advisable to hinder the transportation of the mails (whether letters or packages), nor that of baggage and freight.

The Prussian Minister of Public Works has issued the following instructions to the railroad employees to govern their conduct when illness suspected to be cholera occurs on a train:

1. Every illness is to be considered suspicous in cholera times, which causes vomiting and diarrhea. But there are also severe attacks of cholera, resulting in death, without either vomiting or diarrhea, recognized by the great weakness and exhaustion which often attend the patient very suddenly.

2. The guard is to notify the conductor immediately of every suspicious attack occurring on the road.

3. The conductor will carry the patient to the nearest station provided with the necessary means of transporting the sick and affording provision for their care; and, if another station intervenes before reaching such station, he will notify the station officials to notify immediately the station where the patient is to be removed. The conductor will have a list of those stations where provision is made for cholera patients.

If the patient wishes to leave the train before reaching the station where he would be removed, whether at his destination or not, permission for him to do so must be obtained of the police guard at such station, if there be one there; but if not, he will not be forbidden to leave the train; but the conductor will notify the station master there, who, if the patient will not wait to receive medical attendance at the station, where he will be isolated so far as possible, will make a note of his name, residence and the place where he is to lodge, and report the facts immediately to the nearest police office.

4. As soon as a case of cholera, or suspected to be such, occurs, all passengers in the same compartment with the patient, except persons of his family who wish to remain to care for him, will be removed from that compartment, and where several compartments have a common water-closet, the passengers will be removed from all the compartments which use this closet, and placed in other compartments, where they will be separated from the other passengers.

5. The guard, in charge of that car where the patient is, will take care of him; his first duty is to provide him a place to lie down as comfortable as possible.

6. The conductor of every train carrying passengers will be provided with a bottle containing a mixture of equal parts of simple tincture of opium and ether. 20 to 30 drops of which can be given to the patient, best on sugar.

7. Trainmen must be made thoroughly familiar with the rules for disinfection, that they may protect themselves against infection should they or their clothes come in contact with the dejecta of patients; moreover, passengers who may have come in contact with such dejecta are to be notified of the necessity of disinfection.

The rules for disinfection are sent to all stations, and special attention is called to those regarding disinfection of the hands and other parts of the body, of linen and of other clothing. As a rule, the disinfection is to be carried out at the first station; but in order that it may be effected while running on trains which go long distances without stopping, the conductors of such trains will be furnished with a suitable supply of chloride of lime and potash soap.

The Railroads of the Caucasus and Central Asia.*

The author gives an account of an official inspection of the Vladikavkazskaya, Transcaucasian and Transcaspian railways, made in the autumn of 1891. The Vladikavkazskaya line only is treated in the present article. The inspection began at the Rostov terminus, where the repairing shops are situated. The total length of the line is 908 versts (602 miles), including 169 miles forming the Novorossiiskaya branch line. The line, immediately after leaving the station, passes over the Rostov bridge across the Don. This bridge is 123 sabres (861 ft.) long, and is furnished with a swing mechanism for the passage of boats. At a distance of 16½ miles the line passes over the Poimenodorskii bridge over the flood bed of the Don, which is built after the Indian system, with a large number of small spans (25 spans of 70 ft. each), upon iron piers formed of two iron columns with cast-iron stays. The profile of the main line has a maximum inclination of 1 in 100, and a minimum curve radius of 300 sabzhes (2,100 ft.).

The Novorossiiskaya branch line, which was constructed in 1883-1885, starts from the Tikhoreyetskaya Station, and proceeds in a southwest direction across the Kubanskii steppes to Ekaterinodar, where it passes over the Kuban River and takes a west direction, and at the Akanskaya Station enters upon the mountain country. The line, which has nowhere a gradient above 6 per 1,000, rises up the northwest spur of the Caucasian mountains by a gradient of 1 in 100 and reaches its highest point at about 10 miles distance from the town of Novorossiisk, where it cuts through the mountains by two tunnels, one 3,926 ft. and the other 1,242 ft. long. On leaving the tunnels the line turns sharply to the south, and descends to the Novorossiiskaya Station. The tunnels are both built for a double line; however, in the longer,

* By A. Abrahamsen. From "Abstracts of Papers," Institution of Civil Engineers.

only one line is dug out, and, owing to the favorable conditions of the soil, the mass of rock which would have to be removed for laying the second line of rails has been left untouched. The abutments of the tunnel are faced with roughly hewn limestone set in cement, and they are arched in partly with bricks and partly with cement and rubble. The rails are steel, and, along the level portions of the line weigh 65 lbs. per yard, and along the steep gradients 72 lbs. per yard.

The largest bridge on this line is the skew bridge over the River Kuban. It consists of four spans of 210 ft. each. The abutments are built upon a foundation at a depth of 50 ft., consisting of four sunken stone wells. The internal diameter of the front well is 11.9 ft., and the thickness of the wall is 2.8 ft., while the diameter of the anterior wells is 9.8 ft., and the thickness of walls 2.1 ft. The piers are built upon caissons 43½ tons each, and 37.25 ft. long, and 14 ft. wide. This bridge is also arranged for vehicular traffic.

The bridge across the River Chibit is built in three spans of 70 ft. each.

The author describes in detail the Novorossiiskaya corn elevators. There are 14 granaries in all, having a total area of 295,960 square feet. They are all connected together and with the jetties (of which there are three) by means of India-rubber belts. These granaries are of two types, narrow and wide, and are all built of brick. The narrow have an exterior length of 366 feet, internal width of 46 ft. feet, and internal height of 13.3 feet. They are divided into three sections. The wide granaries are also of brick, and are 378 ft. long, 70 ft. wide, and 46 ft. high. Each one is divided into four square sections, which can be further subdivided by movable partitions. Both types are surrounded by a wooden platform. The entire machinery will be worked by electric motors. The central electric station is to be situated almost in the centre of the granary area, and will be furnished with 5 H. P. Babcock & Wilcox boilers. Two of these boilers are to serve one compound steam-engine (with condenser), of which there will be also two. The dynamos are to be so arranged as to enable their being cut off the main circuit independently of the other. The power is not to exceed 700 volts. The total capacity of the granaries is 2,323,007 bushels. In front of each granary there will be constructed a four storied tower, which will contain an elevator of 48.3 tons capacity per hour, cleaner and weighing machine, and also a 20-50 H. P. electric motor. The author describes the various processes through which the grain will pass starting from the wagons and ending at its shipment on board steamers lying at the jetty. The bands are 28 ft. wide. The total cost of the machinery and alterations required in the granaries is estimated at 125,000 roubles. It is estimated that the elevator will repay itself in five years. Besides this a large granary of 216,000 quarters is being built. This granary will be entirely of brick, with stone stairways, etc. An account is given of the jetties, of which there are detailed drawings, after which the port of Novorossiiskaya and the cement works are described.

The paper is illustrated by numerous plans and elevations of the station buildings, tunnels, bridges, profiles of line, etc., besides many detail drawings.

The Absolute Zero.

We abstract the following explanation of the theory of the location of the absolute zero of temperature from a particularly clear exposition in a recent number of *The Locomotive*: The most accurate thermometer is the gas thermometer, in which the gas may be hydrogen, nitrogen, air, or any one of many other gases. Any one gas expands about the same as any other, when their temperatures are raised by the same amount. It is therefore not a matter of any great importance, for ordinary purposes, what gas is used in making the thermometer.

Now, if a cubic foot of hydrogen, for instance, contracts .0036613 of a cubic foot in cooling from 0 deg. centigrade to 1 deg. below zero, and 2 × .0036613 (= .0073226) of a cubic foot in cooling from 0 deg. down to 2 deg. below zero, there must be some point, if the contraction keeps on at the same rate, at which it will have contracted a whole cubic foot. Thus, in cooling from 0 deg. down to 200 deg. below zero, the original cubic foot contracts 200 × .0036613 (= .73226) of a cubic foot; and in cooling from 0 deg. centigrade down to 273.13 below zero it will contract 273.13 × .0036613 (= 1.00000) or exactly a whole cubic foot. Similarly, a cubic foot of air would contract to nothing if we should cool it from 0 deg. Centigrade down to 272.44 below zero. Carbonic acid, in the same way, would contract to nothing if cooled from 0 deg. centigrade down to 209.5 below zero.

Now, if we should construct a thermometer scale by putting the zero mark at the point which on the present centigrade scale is about 270 deg. below the freezing point of water, no matter what size the degrees on our new scale might be, the volume of any gas, whose pressure does not change, would be proportional to its temperature on the new scale. Here, then, we have found a thermometer scale of some material service to us in making calculations; and it is to be observed that since the size of the degrees we use will make no difference, we may use centigrade degrees about as well as any other ones.

It may be shown by thermodynamics that when a gas reaches the zero point that we have been considering, it cannot expand again. It has parted with all its internal energy, and it cannot cool any further, because it no longer contains any heat. For this reason the zero we have been considering is called the absolute zero.

Now we find above, that hydrogen, air and carbonic acid gas, although they agree in the main, give slightly different results for the position of the point of absolute zero. The reasons for these differences have been investigated experimentally and mathematically by Joule and Thomson, and they will be found in the article on heat in the *Encyclopaedia Britannica*. We cannot enter into a full discussion of these reasons, and it must suffice to say that the corrections are necessary because hydrogen, carbonic acid gas and air are not what are called "perfect gases." They are very slightly viscous, and they differ from the ideal "perfect gas" in other ways, too. By a study of their properties Joule and Thomson deduced certain corrections that must be applied to the figures we obtained above. For all practical purposes we may consider the "absolute zero" to be at the point which, on the centigrade scale, is called "273 deg. below zero." Hence, on the absolute scale the freezing point of water is 273 centigrade degrees above zero, and the boiling point of water is 373 centigrade degrees above zero; and the absolute temperature of anything may be found in centigrade degrees, by adding 273 deg. to its temperature on the centigrade scale.

From the freezing to the boiling point is 100 deg. on the centigrade scale and 180 deg. on the Fahrenheit scale. Hence 1 deg. centigrade is equal to 1.8 deg. Fahrenheit, and 273 centigrade degrees would be equal to

$273 \times 1.8 = 491.4$ Fahrenheit degrees. Hence, the absolute temperature of the freezing point, in Fahrenheit degree, is 491.4 deg.; and since the Fahrenheit zero is 32 deg. below the freezing point, the absolute temperature of the Fahrenheit zero in Fahrenheit degrees, is $491.4 - 32$ deg. = 459.4 deg., or say, in round numbers, 400 deg. Hence to convert the temperature of anything into absolute temperature in Fahrenheit degrees, we add 400 deg. to its temperature on the Fahrenheit scale.

The facts of the case may be summarized as follows: If a gas were cooled to a point 273 centigrade degrees below the centigrade zero, or 400 Fahrenheit degrees below the Fahrenheit zero, it would lose all the energy it contains. It would have no more heat in it, and therefore it could not possibly be cooled below that point. Hence that point is called absolute zero. Furthermore, if the temperature of a gas be varied while its pressure is kept constant, the space occupied by the gas will be proportional to the absolute temperature of the gas. Thus a certain amount of air occupies, let us say, 10 cu. ft. of space at 14 deg. Fahrenheit, and under atmospheric pressure. If we were required to find what space it would occupy at, say 251 deg. Fahrenheit, and at the same pressure as before, we should proceed as follows: The absolute temperature corresponding to 14 deg. Fahrenheit is 14 deg. + 400 deg. = 414 deg.; and the absolute temperature corresponding to 251 deg. Fahrenheit is 251 deg. + 400 deg. = 651 deg. Hence the required volume is found by the following proportion:

$$\frac{14}{414} : \frac{251}{651} :: 10 : \text{Required volume.}$$

Hence

$$\text{Required volume} = \frac{10 \times 651}{414} = 15 \text{ cu. ft.}$$

Many other examples of the usefulness of the "absolute zero," and the "absolute temperatures" of things will be found in treatises on heat, and in the current mechanical, engineering and scientific papers.

Railroad Advertising Expenses.

A writer in the advertisers' periodical *Printers Ink*, Mr. Milton J. Platt, has looked through the annual reports of the principal railroads and finds 28 which report the total of their advertising expenses in item by itself. These are as follows:

Name of company.	Advertising account for the last year reported.
Pennsylvania—Eastern lines only.	\$230,111
Union Pacific.	205,181
New York Central.	132,756
Northern Pacific.	112,843
Atchison System.	111,870
Southern Pacific—whole system.	99,216
Chicago & Northwestern.	92,000
Illinois Central.	47,332
Boston & Maine.	26,657
Rio Grande Western.	26,056
Denver & Rio Grande.	24,221
East Tennessee, Virginia & Georgia.	22,088
Cheapeake & Ohio.	18,254
Fitchburg.	14,296
Texas & Pacific.	13,090
Pittsburgh, Lake Erie & Western.	12,569
Maine Central.	11,911
Concord & Montreal.	9,399
Housatonic.	5,134
New York, Chicago & St. Louis.	1,479
Evanston & Terre Haute.	1,344
Iowa Central.	181
Memphis & Charleston.	122

Mr. Platt says that he has carefully excluded items from reports in which the expenditures for foreign agencies or for printing other than advertising have been included. It will be observed that the amount per mile varies greatly, even on the roads which make the large expenditures. The Union Pacific, for instance, has three times the mileage of the Pennsylvania east of Pittsburgh and Erie.

TECHNICAL.

Manufacturing and Business.

The Foster Engineering Co., of Newark, N. J., has just received an order for a large number of Foster regulators from the Consolidated Car-Heating Co.

The Billings & Spencer Co. reports that its business for the present year has been very large; in amount has far exceeded that of last year. The trade in Billings patent computator bars, drop forged of either lake copper or Tobin bronze, has been constantly increasing. The sales in the machinists' tool department have been very satisfactory and constantly on the increase. The firm is at present erecting a new factory, office and shipping department; the buildings will be 40 x 208 ft., two stories and basement.

The E. W. Bliss Co., of Brooklyn, N. Y., has opened an office and store at No. 15 North Canal street, Chicago, in charge of Mr. C. W. Elsworth, until recently Superintendent of the Chicago Stamping Co. The location of the new store is in the machinery district in Chicago, and a representative line of the presses, drop hammers, shears and sheet metal machinery made by the firm will be always kept in stock.

Messrs. Watson & Stillman have been compelled to run their hydraulic machinery work at 204 and 210 East 43d street, New York City, day and night in order to keep up with their orders. They report the prospect for future business as very promising.

The Samson Cordage Works, of Boston, are adding new machinery to their plant, which will increase the capacity about 25 per cent. They are also putting in a 50-H. P. Mather dynamo and motor for power and lighting purposes.

The Burrowes Car Shade Co., of Portland, Me., is filling orders for curtains for 110 cars on the Chicago, Burlington & Quincy, 25 cars of the Pullman Co. and a number on the Baltimore & Ohio, Pennsylvania and Michigan Central roads. This company's patent window shades are now in use on about 60 railroads.

The St. Paul Clay Car Seal Co. has been incorporated in Minnesota with headquarters at St. Paul to manufacture

car and other seals of clay. The capital stock of the Company is \$25,000 and the incorporators are A. G. Denny, J. A. Warren, M. D. Flower, John J. O'Leary, Philip Reilly and Fred S. Page; all of St. Paul.

Ramsay & Kenyon, of St. Paul, Minn., have been appointed Northwestern agents for the Ball & Wood Engine Co. and the National Machinery Co.

H. C. McNair, of St. Paul, Minn., has been appointed Northwestern agent for the Michigan Bolt & Nut Works of Detroit, Mich.

The American Brake Co. has been organized at Chicago by Noble B. Judah, M. L. Willard and Eugene H. Eupee.

New Stations and Shops.

The Pennsylvania is erecting a one-story brick building, 75 x 40 ft., at Union station, Pittsburgh, in which to place machinery to supply 745 incandescent and 81 arc lights with electricity. The plant is expected to be in operation in a few weeks.

Plans for the new station for the Canadian Pacific at London, Ont., have been approved and the building will be pushed forward to completion without delay.

The Canadian Pacific has let contracts for handsome stations at Portage-la-Prairie and Regina, Man.

The King Bridge Co., of Cleveland, has been awarded the contract for the iron work of the new shops being built by the Gould Car Coupler Co. at the new town of Depew, near Buffalo, N. Y.

The local paper of Houston, Tex., state that a company has been organized through the efforts of O. M. Carter, President of the Omaha & South Texas Land Co., of Houston, to build car works at that city. It is stated that \$350,000 of the stock has been subscribed.

Iron and Steel.

R. S. Farber has resigned the Secretarship of the Central Iron & Steel Co., of Brazil, Ind., and resumed the active duties of his old position as Secretary of the Northwestern Iron & Metal Co., of Chicago.

The Ironton Structural Steel Co., of Duluth, Minn., has recently begun the foundations for its works. General Manager James E. York states that he expects to have the buildings erected and under cover before the severe weather commences, but that the plant will not be in operation until some time next spring.

The Shoulder Tie Plate.

The shoulder tie plate which was put on the market some time ago by the Shoulder Tie Plate Co., of Philadelphia, is made, as has been shown in the *Railroad Gazette*, by punching up a shoulder from the metal of the plate. Somewhat recently the company has introduced a plate with a rolled shoulder, extending the whole width of the plate.

Liquid Carbonic Acid.

Liquid carbonic acid is now being put on the Russian market by a St. Petersburg firm which obtains the gaseous acid as a by-product in the manufacture of Xylolith, a new form of flooring and wall covering. In making Xylolith, magnesite is used which is oxidized and which thus liberates carbonic acid gas. This, instead of being allowed to go to waste, is now collected and compressed in the usual iron flasks. The St. Petersburg firm is said to offer the compressed liquid acid at a very low price.

American Steamships.

William Cramp & Sons will begin the construction of five new steamships for the Ioman line as soon as the Secretary of the Navy approves the plans and specifications. The vessels will be between 500 and 800 ft. long, fitted with twin screws and provided with accommodations for 300 first class and 200 second class passengers. Their cost will be between \$8,000,000 and \$9,000,000. It is said that the Cramps are to build these ships and then send in their bill, no contract having been made for the price.

New Lake Vessels.

The Lake Michigan & Lake Superior Transportation Co. has let a contract to the Detroit Dry Dock Co. for building three steel passenger steamships which will run between Duluth and Chicago. Each of these vessels will be 303 ft. long, 42 ft. beam, and will accommodate 300 first cabin passengers. They will be equipped for fast running and will be furnished in the most luxurious style, exceeding that of any of the vessels now navigating the great lakes. Each vessel will cost \$275,000, and all three of them are to be ready for service early in 1893.

The steel whaleback "James B. Colgate" was launched at the yards of the American Steel Barge Co. at West Superior on Sept. 21. The "Colgate" is 308 ft. in length, 38 ft. beam and 24 ft. depth of hold.

Torpedo Boat No. 2.

The mate to the "Cushing," at present known as Torpedo Boat No. 2, will soon be launched at the Iowa Iron Works of Dubuque, Ia., and will be the first of the new vessels built in interior waters. The new boat is a little larger than the "Cushing," but does not draw as much water. The length is 150 ft., breadth of beam, 15 ft. 6 in., with a normal draught amidships of 4 ft. 9 in. and a displacement of 120 tons. The maximum horse power is 1,800 as against 1,720 for the "Cushing." Each has twin screws, vertical quaduple expansion engines, and each carries three torpedo tubes; those of the Dubuque boat being 18 in. white heads. The new boat has also four one-pounder rapid

fire guns. The guaranteed speed is 24 knots an hour and the contract price is \$113,500. The interior accommodations are rather better than usual. There are two staterooms for officers and a large room extending the entire width of the boat, containing four bunks for petty officers, while the crew's quarters are twelve bunks and swinging space for four hammocks. The stem and stern posts are forged and steel castings combined. At the bow a turtle-back deck accommodates the torpedo tube and loading gear, while the after end works into and terminates in the conning tower. An electric plant for lighting the vessel by the incandescent system and for operating a search light will be installed in the engine room.

Abolition of Grade Crossings in Boston.

The stockholders of the Old Colony Railroad held a meeting in Boston on Sept. 27, and in addition to other business unanimously passed a resolution accepting the provision of an act passed by the Massachusetts Legislature last June for raising the grade of the Providence Division and abolishing all the street grade crossings on the line in Boston. The directors were empowered to carry out the proposed scheme and authorized to issue so much of the capital stock as may be necessary for the purpose. The execution of this plan will cost about two and a half millions of dollars and will get rid of all street grade crossings for a distance of nearly 11 miles from the terminal station in Boston. Under the provision of the act the cost of the proposed change will be paid as follows: Old Colony Railroad, 55 per cent. of the cost: City of Boston, 30 per cent., and the State of Massachusetts 15 per cent. Careful studies have been made by the engineer of the road, and the plan is the same as that presented by the Rapid Transit Commissioners to the Massachusetts Legislature last May, which is described and illustrated in the report of the Chief Engineer. The carrying out of the plan is now under the charge of a special Commission appointed by the Legislature, and when completed will enable the Old Colony Road to handle the large traffic of the Roxbury district with rapidity and ease.

Two Large Freight Steamers.

Contracts have been signed for the immediate construction of two 8,000 ton steamships on the Clyde for the International Navigation Co. They will ply between Philadelphia and Liverpool, and will carry no first cabin passengers, but will be fitted for the transportation of immigrants.

Electric Street Railroads in Chicago.

The Chicago City Railway Co. is preparing to equip several of its cross-town lines with electric power, but the details of the plan have not yet been fully worked out. The plan involves the extension of the Sixty-first street line so as to reach the World's Fair grounds more directly. This will be operated by horses temporarily until the electrical equipment is completed. The first electric lines to be completed will be the Sixty-first and Sixty-third street lines. Following these, it is proposed to equip lines on Thirty-fifth and Forty-second streets

A Sixteen Story Building with Aluminum Fronts.
A sixteen story building is no longer much of a novelty in Chicago, but one which is soon to be erected on the corner of State and Madison streets has some unusually novel features. In place of the usual brick or terra-cotta facing, aluminum plates are to be used on both fronts of the building. The building itself is of the usual fireproof construction, with iron columns, but the fronts between the windows are to consist of cast aluminum plates about $\frac{1}{2}$ of an inch thick, which are to be held in place by strips of cast aluminum. The plates will be about 36 x 20 in. and the holding strips are to be about six inches wide, and are fastened to angle irons attached to the window casings. The space back of the plate, between them and the columns, is to be filled with fireproofing and the small spaces back of the holding strips with Portland cement. The composition of the plates and strips is to be about 90 per cent. aluminum and 10 per cent. copper. Another feature of the building, which is almost as striking as the nature of its exterior, is the size of the windows, some of which are 22 ft. across. As is generally known, buildings in Chicago are now limited to height of 12 stories, but the limiting height in feet is not stated. This building will be built, however, under a permit granted prior to the passage of this ordinance, and so can be carried to the full height of 16 stories. It is evident that the appearance of this structure, 16 stories high and outwardly composed entirely of plate glass and aluminum, will be novel and striking.

Prince Edward Island Tunnel.

Mr. Alfred Palmer, C. E., engineer in charge of the boring in connection with the Northumberland Straits tunnel, says: "Of the work done in the Straits, in spite of a four-knot current and perpetual storms, I have brought up from 100 ft. below the bottom of the sea, and through 104 ft. of water, perfect cylindrical cores, which show exactly the geological formation through which the proposed tunnel is to pass. The test holes are bored 50 ft. apart, penetrating a carboniferous sandstone base. A steam diamond drill running a thousand revolutions per minute is used. This drill is attached to an iron tripod resting upon the bed of the sea and firmly secured

to anchors. A pontoon with boilers and pumps attached is moored alongside the tripod, and steam and water are conveyed to the drill through flexible pipes."

Mr. Palmer has just received his patents for a new invention relating to subaqueous tunneling. The invention consists in steel caissons, which are sunk down the whole depth of the water and through the earth to a depth equal to the diameter of the tunnel, then through lateral openings in the caissons, the horizontal borings are made for the tunnel work. Thus by boring the tunnel sectionally Mr. Palmer estimates that one half of the time can be gained over the old system of boring from each end of the proposed tunnel with shields.

Interlocking Plant at Duluth, Minn.

The contract for installing a complete 10-lever plant at West End Junction has been let to the Union Switch & Signal Co. This plant is the joint property of the St. Paul & Duluth, Northern Pacific and the Duluth Transfer Co., and covers a junction of double track, a grade crossing and one side track.

Dry Dock at West Superior, Wis.

The dry dock of the American Steel Barge Co., at West Superior, Wis., was completed and tested on Sept. 15, as noted last week. This is the largest dry dock on the Great Lakes, being 500 ft. long, 100 ft. wide and 20 ft. deep. There has been used in the construction of this dock over 2,000,000 ft. of dimension lumber, besides upward of 20,000 piles. The dock is designed to accommodate two large steamers at the same time and, as shown by the recent test, can be entirely emptied in from two to two and one-half hours. The work of construction was begun early in November, 1891.

St. Paul & Duluth Terminal Improvement.

The work on the improvements to the St. Paul terminals of the St. Paul & Duluth is being pushed. Nelson & Co., of St. Paul, have the contract for grading; Sherwood & Sumner for piling; M. P. Ryan for the freight house, and the trestles will be built by the company. There has been a slight change in the freight house, making the main floor for handling freight 450 ft. long, and using the second story of the first 50 ft. as office for the local freight department. There will be two of the three sets of trestles, for coal yards, erected this season between East Fourth and Seventh streets. Next spring the yard at Cleymont will be built, and 90-lb. rails will be laid, between it and the lower yard, on the heavy grade.

The "Columbia's" Engines.

The engines of the new triple-screw cruiser "Columbia" are the most powerful ever designed in the United States for marine purposes, the total indicated horse power of the three engines being 21,000. Each engine will be of the triple-expansion type with cylinders 42 in., 59 in., and 92 in. diameter, and 42-in. stroke, and are to be run 129 revolutions per minute. The two air pumps for each engine are to be vertical, single-acting, lifting pumps, 22 in. diameter and 20 in. stroke, driven by two small, simple engines with cylinders 7 in. diameter and 12-in. stroke. The main condensers, of composition metal and sheet brass, will have about 9,450 sq. ft. of cooling surface.

There will be eight double ended main boilers and two single ended auxiliary boilers of the horizontal return tubular type, all built of mild steel to carry a steam pressure of 100 lbs. per sq. inch. Six of the double ended boilers are to be 15 ft. 9 in. outside diameter and 18 ft. long, with eight corrugated furnaces 3 ft. 3 in. internal diameter. The other two double ended boilers will be 15 ft. 3 in. outside diameter, and 18 ft. long, with corrugated furnaces of the same size as the other six. The single ended boilers are to be 10 ft. 1½ in. outside diameter and 8 ft. 6 in. long, with two corrugated furnaces of 2 ft. 9 in. internal diameter; the total heating surface for all the boilers being 42,248 sq. ft., with a total grate area of 1,522 sq. ft.

The auxiliary boilers will be placed above the protective deck for use in supplying the bilge pumps, steam fire pumps, capstans, etc. The main boilers are arranged in groups of two, in four separate watertight compartments, with five athwartship firerooms and three smokestacks. Forced draft will be supplied on the closed fire-room system.

In addition to the above, there will be evaporators, distillers, reversing and turning engines, fire and bilge pumps, an ice machine, steam ash hoists, capstan engine and the other auxiliaries to be found upon a modern ship. Finally, a feature of the design is that by which each propeller is attached to its shaft by a clutch coupling so that it may be disconnected and left free to revolve, thus but slightly retarding the headway of the vessel when it is being propelled by one or two engines.

Further, the screws are not in the same horizontal line, but the side ones are placed as high as their diameters will permit, while the shafts diverge from the central line outward at an angle of four degrees and also slightly upward. At the same time the middle shaft is in the central line of the ship but is inclined a trifle downward. The central screw will have four blades and 10 per cent. more pitch than the side ones, as it will work in more or less disturbed water. The side screws will have three blades and will be located about 15 ft. ahead of the central one. The estimated speeds at which the vessel can be driven are: With one engine, 15 knots per hour; with two engines, from 18 to 19 knots, and with the three engines, 22 knots.

THE SCRAP HEAP.

Notes.

A newspaper item states that the Pennsylvania has lately introduced the piece work system at its Pottsville shops.

The Louisville, New Albany & Chicago, which lately put on dining cars between Chicago & Louisville, serves food à la carte, instead of charging a fixed sum for a meal.

The Philadelphia & Reading is preparing a new sign to put at railroad crossings. Instead of only the words "Railroad Crossing," there will be added the words "Stop, Look and Listen."

It is said some Northern Central employés, who had received coal from the company at \$4.10 a ton, abused the privilege by selling to their friends, and now the company will sell no more coal to employés.—*Exchange.*

The Columbus, Hocking Valley & Toledo has raised the pay of conductors from \$3 to \$3.25, and the brakemen from \$2 to \$2.15 a trip. This apparently means freight trainmen only. It is said that the new rates are the same as those paid by other roads in that territory.

Dispatches from Cedar Rapids, Ia., last week, reported that the telegraph operators of the Burlington, Cedar Rapids & Northern had struck for higher wages, 200 men being out. The later reports seem to indicate that the railroad has got along without the strikers.

The Central Railroad of New Jersey is constructing an inclosed waiting room on the south side of its tracks at Westfield, as a result of repeated protests from its patrons against the fence which the company erected between its tracks. Passengers are no longer compelled to use the tunnels. A man has been stationed at a gate in the fence to allow passengers to cross the tracks.

The report has been going the rounds of the papers that the Pennsylvania would place two engineers and two firemen on the locomotive of each fast passenger train. The only basis of fact for this seems to be that some of the largest freight engines have two firemen when hauling trains up the steep grades, the heavy work making it necessary for these two men to relieve each other frequently.

The Chicago, St. Paul, Minneapolis & Omaha, has issued orders to its agents instructing them to prevent the placing of boards, posters or other advertising matter on the cars of the company. "The use of box cars for bill boards has become a great nuisance in the West," says a correspondent. It may be added that it is sufficiently so everywhere to warrant vigorous action.

The train service of the Chicago & Northwestern line between Chicago and St. Paul and Minneapolis has been again improved. The latest addition is a number of 12-section compartment cars, which are now run on the limited trains. Each compartment is provided with an individual lavatory, which is supplied with hot and cold water. Another improvement is in the makeup of the trains. The sleepers and buffet smoking car are placed in the middle of the train, with the day coaches on the rear end.

There is no cholera news of importance this week, except from Texas, where, by order of the Governor, a somewhat strict medical inspection is being enforced on all the railroads entering the state except the Atchison, Topeka & Santa Fe. Freight and mails going through the state are not subjected to delay. A tourist sleeping car with 15 passengers was quarantined in the wilds of Southern California last week, on account of a suspicious case of sickness among the passengers. There has been some little friction in the matter of requiring health certificates at a few other points.

Baku, the oil-producing centre of Russia, has for some time been agitating the matter of establishing a school for instruction, both practical and theoretical, in deep well boring. Such a school is now to be started. The proposed course of instruction is to be three years. Two years of the course are to be devoted to theoretical studies, and the remaining year is to be spent in practical work. Students of all ages are to be admitted providing they have a fair, ordinary school education. It is thought that in this way workmen now engaged in well drilling operations can enjoy the advantages of further training in their line with profit to themselves and the oil well industry.

The building of the Siberian railroad is to be accompanied, among other things, by a more or less detailed geological examination of the country through which it will pass. The geological foundation of Siberia is comparatively unknown, and only a few limited districts, mainly the mining districts of Altai and Nertschinak, have thus far been made objects of careful geological research. The examinations now proposed will have a direct, practical value, since they are to be made along the line of the railroad, and will afford information as to available water supplies, coal and iron ore deposits, and other underground riches which may help to materially reduce the cost of building the road. A prospecting party is to be put in the field at once, and it is to begin its operations in the Tobolsk-Akmolinsk mining district, and in the Tomsk and Jenissei departments.

Foreign Notes.

The official Swiss railroad statistics for 1890 show that at the end of that year the total length of lines amounted to 3,150 kilometres, or about 1,900 miles. Of this length 1,020 miles belonged to the main lines, about 6½ miles were represented by cable roads, and the remainder, or about 24 miles, belonged to the several street railroads.

Paris is still wrestling with its metropolitan railroad problem, none of the projects thus far proposed having yet received official approval. One of the designs which, it appears, is just now attracting a good deal of attention is that of the Société d'Etudes de l'Intra-Urbain, which provides for an elevated road running through the city and connecting all the existing street car lines. From the available particulars it appears that a thoroughfare, about 160 feet wide, is to be built through the city, and in this is to be erected a 50 ft. platform on pillars about 23 ft. high, designed to accommodate four railroad tracks. Underneath these tracks there is to be a central covered walk for foot passengers, and at each side of it a roadway about 42 ft. wide. Each of these roadways, again, is to have at its outer side a 13 ft. promenade.

World's Fair Notes.

The Hercules Iron Works of Aurora, Ill., are building two 50-ton ice machines for use at the World's Fair.

A good idea of the expected attendance at the World's Fair is given by the fact that a Mr. Morgan, who has secured the "peanut concession" at Jackson Park, gives bonds for \$125,000, and pays the exposition company 70 per cent. of the gross receipts, and guarantees that this amount will not fall below \$140,000.

The liverymen of Chicago have exhibited characteristic greed in connection with the dedicatory exercises, and demand from \$20 to \$25 a day for carriages. The World's Fair Executive Committee received bids at \$20 and \$22, but it was finally decided that \$15 was a reasonable price and that the committee would not pay more than this.

The details for the sale of \$4,000,000 of bonds have been perfected by the executive committee. The bonds will be placed on the market Oct. 1, and subscription books will be closed Oct. 15. They will bear 6 per cent. interest and will be payable on or before Jan. 1, 1894, and will be issued in denominations of \$100, \$500, \$1,000, and \$5,000. The estimated receipts as given in the prospectus amount to \$34,500,000, and the disbursements, \$21,250,000.

The sanitary arrangements for the World's Fair have been very thoroughly worked out. The sewage will be led in pipes to a tank in the southeast corner of the park, where it will be purified by treatment with sulphates and by means of settling tanks. The capacity of the purifying plant will be 6,000,000 gallons a day. In the same part of the grounds a crematory for garbage is to be built, which it is expected will satisfactorily dispose of the garbage from all parts of the grounds. This crematory system is an exhibit in the Liberal Arts department.

Work is progressing on the pipe line from Waukesha to the Exposition Grounds, which is being laid by the Hygeia Co. and it is expected that the line will be completed by Dec. 1, at the latest. The distance is 105 miles, with a fall of 250 ft. The estimated cost of the line is \$750,000. The pipe is to be 6 in. in diameter throughout its entire length and it is expected to deliver 500,000 gallons per day. In the Exposition Grounds a pump-house will be erected over a reservoir of 100,000 gallons capacity, into which the water will flow from the main line pipe. The main distributing pipes within the grounds will be 3 in. in diameter and with their lateral branches will aggregate 25 miles in length. Before passing into the distributing pipes the water will be cooled by contact with a refrigerating coil, so that it will be delivered to consumers at a temperature of about 38 deg. There are to be 250 fountains in booths throughout the grounds, 20 or more of these being in the Manufacturers Building.

The Committee on Ceremonies is making very careful arrangements for the dedicatory exercises. Seats will be provided in the Manufactures Building for 80,000 people, and there will be standing room for 35,000 more. Of the seats, 15,000 are specially reserved, and holders of general invitations will have no seats reserved for them. On a stage erected on the east side of the building 2,500 seats will be arranged for distinguished guests. Immediately in front of the speakers' platform space is reserved for 750 press representatives. Excellent provision is made for exits and entrances, as there will be 300 doors in all, on the north, west and south sides of the building. Leading from the entrances are aisles which are 8 ft. in width near the centre of the building, and 12 ft. wide at the outer ends. Aisles running the entire length of the sections will be 12 ft. wide, broadening to 16 ft. at the ends. The choir of 5,000 singers and orchestra of 300 pieces are located at the south end of the building. The programme as now arranged for the dedicatory exercises proper in the Manufactures Building will occupy four hours. It is said that in the parade, which takes place Oct. 20, there will be 80,000 people in line.

Russian Railroads.

The recent famine has increased railroad building in Russia, and a number of new roads have been commenced in order to give the "starving peasants" something to do. There is a new line being built along the Caspian Sea, and Kazan is being connected with the railroad system of the Volga. The chief of the railroad branch of the interior department of St. Petersburg, with whom I talked the other day, tells me that the work on the Trans-Siberian road is still going on and that about 150 miles of it has been built from Vladivostock, on the Pacific, to the west, and that the work is advancing in other parts of Siberia. This railroad when completed will increase the immigration from about 10,000 a year, which it is now, to hundreds of thousands, and it will result in the opening up of north Asia to civilization.

Russian railroads are well ballasted, and in the thousands of miles which I have now traveled in Russia I have yet to find a rough road or one that is badly managed. The trains are always on time and the roadbeds are wonderfully well kept. The road between St. Petersburg and the frontier is weeded as carefully as the best kept garden, and I saw women on their knees scraping out the weeds between the ties with knives. All of Russia north of Moscow is made up of dense woods and the locomotives burn wood.

Some of the customs of travel are curious. I found it very inconvenient even in the first class sleeper during the first part of my present tour. I had neither soap nor towels with me and I had to rely upon the guards for these as well as for my pillows and bedding. In none of the sleepers do they expect to furnish you much more than a place to lie down upon. You are expected to carry your own sheets, and in a first class hotel, which I found at Saratoff, I had to make a very pronounced kick before I could get any bedding. . . . It doesn't pay to carry much baggage in Russia. I have a trunk with me that weighs about 200 lbs. and it costs me \$5 every time

I move. Only 40 lbs. of baggage is allowed with a ticket here and the excess is always charged for. There is no charge, however, for packages carried inside the cars, and the result is that every passenger has a half dozen bundles and the cars are filled with packages and baskets and trunks with handles on them.—F. G. Carpenter in *Buffalo Express*.

A Railroad Church.

The officials of the Pennsylvania Railroad have given over the Third Street Methodist Church property in Camden, N. J., recently purchased by the company for \$65,000, to the uses of a railroad Y. M. C. A. Five hundred men employed on the various roads centring in Camden have pledged themselves to join the organization, and the church building will be fitted up as soon as vacated by the congregation. The road had to buy the property to silence the complaints of disturbance by the noise of engines and trains.

The Nicaragua Canal.

Mr. Cleveland's letter of acceptance contains the following: "The importance of the construction of the Nicaragua Ship Canal as a means of promoting commerce between our states and with foreign countries, and also as a contribution by Americans to the enterprises which advance the interests of the world of civilization, should commend the project to governmental approval and endorsement."

Steel Coal Barge.

Pittsburgh's first steel coal barge was launched last week. It is 135 ft. long and 24 ft. wide, and of the same form as the wooden barges. The latter cost \$1,400 and last ten years, with repairs that come to as much again. A steel barge, it is estimated, will cost \$4,200 and last, perhaps, 50 years, without heavy repairs. The firm that has built the new barge proposes to replace its wooden by steel barges, if the scheme succeeds.

The Reading and the State of New York.

The result of the inquiry of the Special Committee of the New York State Senate into the combination of the anthracite coal railroads was announced Tuesday, in the form of a report recommending that proceedings be begun by the Attorney-General to annul the franchise of the Lehigh Valley Railway Co. in New York, for participation in an illegal combination. Action against the Delaware, Lackawanna & Western Railroad is also advised. The counsel of the committee, Daniel G. Griffin, read an opinion in which were embodied the deductions from the testimony taken by the committee, as well as his views as to the legality of the leases to the Philadelphia & Port Reading Railroad Co. of the lines within New York controlled by the Lehigh Valley Railway Co., and his suggestions as to measures to be adopted by the Attorney-General. Upon the question whether the corporations concerned have been guilty of any offense against the law, the opinion cited section 7 of the Stock Corporation Law, which provides that no corporation shall combine with another in order to prevent competition. The opinion also cited a statutory prohibition against the consolidation of two parallel and competing lines as another ground of attack upon the companies involved. To be sure, the parallel competing lines of the Reading and the Lehigh Valley Railroad Companies lie outside of the State and belong to foreign corporations. Yet Mr. Griffin was of the opinion that the spirit of the prohibition would cover a lease by the Lehigh Valley Railroad Co., a New York corporation, of its lines to the Lehigh Valley Railroad Co., a Pennsylvania corporation, and the lease by the latter again to the Reading. The other remedy suggested by Mr. Griffin was bringing an action by the Attorney-General for the purpose of having declared void and of no effect the leases entered into. The opinion recommended finally, first, that an action be brought against the Lehigh Valley Railway Co., organized under the laws of New York, to vacate its charter because it has entered into an illegal agreement, and, secondly, as the Delaware, Lackawanna & Western Railroad Co. is a foreign corporation, that an action be brought against it to obtain a forfeiture of its leases of various lines lying within the state, and built by corporations organized under the laws of the state.

The State's Attorney has brought a suit at Chicago to enjoin the Philadelphia Coal & Iron Co. from doing business in Cook County. The petition is based on some evidence gathered by the *Inter-Ocean*, going to show that the Reading has established an unlawful conspiracy in restraint of trade.

Cars in the Northwest.

There has been a scarcity of cars in the Northwest, but so far it has not caused serious inconvenience to either the shippers or the railroads. The causes which have led to the shortage are the great rush in lumber shipments to the Southwest brought about by the advance in lumber rates, heavy shipments in coal and the movement of the wheat crop. Hundreds of cars loaded with lumber were detained in the yards and on the side tracks in the Southwest, as it was not possible to track them for unloading. This congestion has been greatly relieved and the railroads generally are enforcing a demurrage charge at all stations where there are no car service associations. There is, at present, no indication of a car famine.

Street Railroad Projects.

C. N. Parker will build an electric street railroad, at Brainard, Minn., $3\frac{1}{4}$ miles in length. It will extend from the south end of Sixth street to the station of the Brainard & Northern Minnesota. Work of construction is to begin Oct. 15.

The Duluth Street Railway Co. has awarded the contract for building an extension to Lakeside. The work is to be completed before Nov. 15, and will make the Superior street line 15 miles in length.

A New Pipe Line Company.

The United States Pipe Line, a new organization at Bradford, Pa., has elected the following officers: President, Lewis Emery, Bradford; Vice President, H. B. Berwald, Titusville; Treasurer, John Fertig, Titusville; Secretary, E. C. Jones, Bradford. The company starts with a paid-up capital of \$600,000. It is said that the right of way for the line from Bradford to New York has been secured, and the telegraph line to be used by the company is now being strung.

Labor in the Northwest.

The scarcity of men and teams in the Northwest is preventing much new work, and causing no little inconvenience to the railroads in keeping employed a sufficient force of section men for maintenance of track and roadbed. This is largely due to railroad construction, which has given employment to a great number of laborers who

would ordinarily be found working in section gangs. Then, at this season of the year, there are very considerable demand for laborers in the harvest fields. In a few weeks the lumber men will begin to send their crews into the woods for the winter, taking out of the market all of the men who have finished work on construction or in the harvest fields. Contractors have been paying from \$2.00 to \$2.25 a day for laborers and the prevailing rate for harvesting is from \$2.50 to \$3.00 a day. It is difficult for the railroad companies to keep their crews full, when the daily rate paid by them for section labor is only \$1.25 or at the most \$1.40 a day.

The United States Car Company.

A dispatch from Anniston, Ala., reports that at the Receiver's auction on Wednesday the movable property of the United States Rolling Stock Co. there was sold to George W. Ristine, General Manager of the new United States Car Co., who bought for his company. The new company has also leased the plant there from Receiver Luna.

LOCOMOTIVE BUILDING.

The Pittsburgh Locomotive Works has completed a compound locomotive for the Pittsburgh & Western, and the engine is now being tested in freight service on that road. It is a two cylinder engine, high pressure, 19×26 in., and low 20×26 . It is a 10-wheeler, and its driving wheels are 52 in. in diameter. The weight is about 135,000 lbs.

CAR BUILDING.

The Mount Vernon Mfg. Co., of Mount Vernon, Ill., is to build 1,000 stock cars (Hicks patent) for use on the Cleveland, Cincinnati, Chicago & St. Louis.

BRIDGE BUILDING.

Alton, Ill.—The southern abutment of the new bridge across the Mississippi River at Alton was completed Sept. 20. Work is in progress on the piers.

Black Creek, Ont.—M. D. Barnhead, Reeve of Wiloughby township, is receiving tenders for the building an iron bridge across Lyon's Creek, known as Enoch Dell bridge.

Bracebridge, Ont.—The Commissioner of Crown Lands has approved the plans for a new iron bridge to be built over the river here.

Cincinnati, O.—Sealed proposals will be received by the Board of Hamilton County Commissioners until Oct. 5, for the following county work: Wrought iron truss bridge over N. W. Railroad, on Linden avenue, in Millcreek Township. The work to be done according to the plans now on file with County Commissioners; also for the wrought iron superstructure of a bridge over the Sycamore Creek, on the Montgomery and Porter's Mill Road, Sycamore Township.

The Board of Assessment of Cincinnati is considering the erection of a drawbridge over the canal at Liberty street, built on the same plan as one at Dayton.

Floresville, Tex.—The County Commissioners Court has decided to call for bids for two iron bridges in the county; one to span the Cibolo River at Lavernia, the other to span the San Antonio River near the town of Calaveras.

Helena, Mont.—Proposals will be received until Oct. 20 by the county clerk for an iron combination bridge over the Dearborn River near the Roberts place. The bridge will be 180 ft. long. Also one on Prickly Pear, above Kissipaugh's, 80 ft. span with iron piers, with wooden approaches on piles. Also for two wooden bridges above Mitchell's.

Houston, Tex.—The Youngstown Bridge Company has secured the contract for building an iron bridge across the Brazos River on the Houston extension of the Missouri, Kansas & Texas road.

Marietta, Ga.—Sealed bids will be received until Oct. 10 for constructing a bridge over Hottowood Creek.

Mill City, Or.—The County Commissioners of Linn and Marion Counties met last week to open bids for building the bridge across the Siuslaw River, at Mill City. Nine bids were presented, but those of the Pacific Bridge Co. and the Portland Bridge Co. were withdrawn. The other bids were: Oregon Bridge Co., Pratt truss combination, \$3,500; California Bridge Co., Pratt truss combination, \$5,520; St. John & Stone, Howe truss, \$2,100; Frank J. Miller, Smith truss, \$1,904; Cline & Bleakney, Howe truss, \$1,565; C. F. Royal, Howe truss, \$2,300. The contract was awarded to Frank J. Miller for \$1,312. The bridge is to be a 176-ft. span structure, with a second span 70 ft., and the approach from the Linn County side about 100 ft. Wooden piers will be used, and the floor will be 37 ft. above low water.

Mount Vernon, Wash.—Bids are now called for on the Baker River Bridge, near Mount Vernon. The bridge will be a combination steel truss, consisting of one span of 200 ft., with one approach 30 ft. on the west side and 15 ft. on the east side.

Newport, Ky.—The iron work of the main span for the new highway bridge across the Licking River between Covington and Newport on Twelfth street was completed last week. The bridge was built for the Kentucky & Campbell County Land Co. This is the bridge on which two members of the firm of Baird Brothers, of Pittsburgh, who were the contractors for erecting the bridge, lost their lives, with 25 others, by the fall of the false work on June 15 last.

Ottawa, Ont.—Two years ago Parliament voted for the construction of a bridge over the Rideau Canal at Marie street in this city. The government and the city council disagreed over the location of the electric street road in front of the parliament buildings and the Government refused to build the bridge. It is understood that another attempt will be made to secure the construction of a new iron bridge over the canal.

The Thousand Islands Railroad Co. has made application for the approval by the Governor General of the construction of a bridge across the mouth of the Gananoque River, and has deposited the plans and a description of the proposed site with the Minister of Public Works.

Pittsburgh, Pa.—The work on the new suspension bridge at Sixth street to connect Pittsburgh and Allegheny

is now making rapid progress, and it is expected that it will be opened on Dec. 15. The span on the Pittsburgh side of the river was completed last week and the false work is being removed. The two main spans are 445 ft. long and the span on the Allegheny side across the Pittsburgh & Western Railroad is 42 ft. long. The bridge, when completed, will have a roadway 42 ft. wide and 10 ft. sidewalks. It is being built by the Union Bridge Co.

Rome, Watertown & Ogdensburg Railroad.—The New York Central is rebuilding the bridge over Oak Orchard Creek on the line of the Rome, Watertown & Ogdensburg Railroad. The creek at this point is about 300 ft. wide, and the total length of the bridge is 848 ft. The new structure will be of plate girder spans, each 65 ft. long, resting on eight towers and two trestle bents. The towers from the masonry to the top of rail are 67 ft. 8 in. high, and these stand on masonry piers rising a few feet above the water. The bridge—girders and towers—is to be of open hearth, acid steel, all rivet holes drilled, and there will be about 450 tons in the girders and towers. The company is also building a number of through plate girder bridges 122 $\frac{1}{2}$ ft. long, 118 ft. clear span. Fifty bridges are under construction. About all of the bridges on the Utica & Black River Division have been recently replaced with plate girder bridges from 68 to 110-ft. span; among them are the long bridges at Carthage and the bridge over Deer River. These new bridges are designed by Mr. Thomson, of the New York Central & Hudson River.

St. Paul, Minn.—Work has been begun on the steel highway bridge over the right of way of the Chicago, St. Paul, Minneapolis & Omaha, at Payne avenue. J. McClure has the contract for masonry walls and piers, and the Lassig Bridge & Iron Works for the superstructure. The bridge is 120 ft. long, consisting of three spans 51 ft., 48 ft. and 27 ft. respectively. The width is 60 ft., having a 40-ft. roadway and sidewalks each 10 ft. wide.

The Great Northern has refused to build the bridge over its right of way, connecting Grove and Eighth streets, which was ordered by the city.

Toronto, Ont.—Two tenders were received for the construction of an overhead footbridge at McMurray avenue. That of the Hamilton Bridge Co. at \$4,976, was the lowest, and it was referred to the Engineer.

Vancouver, B. C.—Messrs. William Rennie and D. K. Campbell have been awarded the contract for building the Government bridge across the Squamish River.

Wheeling, W. Va.—The Wheeling & Belmont Bridge Co. has perfected its arrangements for the new steel bridge across the "Back" River from Wheeling Island to Bridgeport, O., and will soon be ready to let the contract. The new structure will be of steel and will be erected without taking down the present wooden structure spanning the river. N. Hildebrand is the engineer of the work. He has been in Wheeling consulting with the directors of the bridge company for a week and preparing the details of the work.

Winnipeg, Man.—The erection of a new iron or steel bridge over the Assiniboine River at Main street is spoken of.

RAILROAD LAW—NOTES OF DECISIONS.

Carriage of Goods and Injuries to Property.

In Illinois the Supreme Court holds that a railroad without compensation to construct and maintain street crossings over its railroad, by a statute enacted for the public safety under the police power of the state, is not a taking or damaging of private property without just compensation.

In the Federal Court it is laid down that a contract by a railroad to fence its track through certain lands imposes upon it the same duties and liabilities with respect to the killing of stock as would be imposed by a statute requiring it to fence.

In Tennessee the Supreme Court rules that a contract for the shipment of live stock, wherein the shipper stipulates that he has examined the car, and accepts it as suitable and sufficient, does not estop him from recovering for injuries to any animal caused by a defect in the car, since a carrier cannot limit its common law liability so far as to exempt itself from the consequence of its own negligence in furnishing an unsafe vehicle.

In Connecticut the plaintiff at defendant's freight office in W., asked the freight cashier the rate of freight to B. The cashier, not knowing the rate, repeated the question to the way-bill clerk, who, on account of noise, misunderstood the cashier, and gave an erroneous rate. His only means of knowing the rate was by reference to the tariff-sheets which hung in the office for the convenient use and information of all shippers, the rates in which could not be changed by any employé. The cashier's duties did not require him to know the rate. On the erroneous answer of the way-bill clerk, the cashier figured up the amount of plaintiff's shipment, who afterward delivered his goods, paid the amount to defendant, and requested shipment to B. Shortly thereafter the error was discovered, but plaintiff could not be found, and the goods were forwarded with instructions to the agent at B. to hold them for the additional charges based on the correct rate, and which were fair and reasonable, and would have been paid by plaintiff if he had been correctly informed before shipment. Plaintiff refused to pay additional charges, demanded the goods at B., and sued for conversion. The Supreme Court of Errors decided that there was no contract of shipment, and defendant was entitled to hold the goods at B. until it received its reasonable charges for transportation.

The Supreme Court of Texas holds that where a railroad company receives loaded cars from another company it is not liable for a failure to inspect such cars and have them properly loaded.

In Kansas the Supreme Court rules that where, after stock has been loaded on a train which is ready to start, the carrier tells the shipper that the stock will not be allowed to go out unless he signs a special contract limiting its common law liability by requiring that the shipper must give notice of his claim for damages for any injury to the stock before removing it from the place of delivery, or mingling it with other stock, the contract is not freely and fairly made, and does not bind the shipper.

A Texas statute makes it the duty of a common carrier of live stock to feed and water the same during the time of conveyance, unless otherwise provided by special contract. The Supreme Court holds that, if the stock is transported in cars which are not properly constructed for feeding and watering the stock, then it be-

comes the duty of the carrier to furnish places where the stock may be unloaded, watered and fed without injury in any kind of weather.¹

In Maryland in an action for injury to wheat from a flood while in a car standing on a side track, it appeared that at 7:30 a train which had put out from the station was driven back by water over the track. Before that time the company's agent at the station had noticed that the water was rising. At about 8:30 the agent asked the conductor and engineer to haul the cars from the side track to the main track, which was on higher ground, and which was at no time covered by the water; but they refused, fearing that the water, which was then over the side track, would put out the fire in the engine. They testified, however, that a short time after they got back to the station they looked, and the water was not over the side track. The Supreme Court rules that the evidence was sufficient to warrant a verdict for plaintiffs, on the ground that the loss was due to the failure of defendant's agents to exercise ordinary care and diligence in removing it to a place of safety.²

The Supreme Court of Missouri decides that the statute of 1879 providing that when property "is received by a common carrier to be transferred from one place to another within or without this state, or when a railroad or other transportation company issues receipts or bills of lading in this state," it shall be liable for any loss, damage or injury to such property, caused by its negligence or the negligence of any other common carrier, etc., to which such property may be delivered, or over whose line such property may pass, is constitutional.³

In New York the Supreme Court rules that land acquired by a railroad company by purchase instead of condemnation proceedings, for terminal facilities within the city limits, may be taken by the city for street purposes without the aid of special legislation.⁴

Injuries to Passengers, Employees and Strangers.

In Minnesota the plaintiff was employed as brakeman on train of logging-cars, operated on a short railroad, with ordinary locomotive engines. The cars were built very low, and the drawbars thereof, used for coupling, were so much lower than that of the engine that when the engine was backed up to a car the drawbar of the car passed under that of the engine, and there was nothing to prevent the tender from colliding with the body of the car, unless the engineer was careful to stop it in time. The facts were well known to plaintiff, who was injured while attempting to couple the engine to a car, by the engineer's backing the tender against the car. The Supreme Court holds that plaintiff assumed the risk of this condition of the cars and engine, and of the negligence of the engineer.⁵

In Missouri the Supreme Court holds that running a train in a city in violation of a city ordinance is negligence per se.⁶

In Massachusetts in an action for personal injuries incurred by the moving of a car which plaintiff was coupling to a train, and which was not secured because the brake head was broken, it appeared that plaintiff, with others, was engaged in loading the cars with stone at a quarry; that the cars used were frequently injured and that a man came twice a week to repair them. Plaintiff testified that, if the brakes of a car would not work, it was the practice to keep it attached to the engine or to other cars by whose brakes it could be controlled, or, if used alone, to hold it by chocking the wheel; that, if a car became unsafe, it was the engineer's duty to set it aside for repairs; that two or three days before the accident he saw a car with a broken brake head in the stone pit, but did not call the engineer's attention to it. The Supreme Judicial Court decides that the negligence, if any, was that of fellow servants or of the plaintiff, and not of the master.⁷

In Kentucky the plaintiff was injured while blasting rock in defendant's quarry, and sought damages therefor on the ground that by reason of defendant's failure to remove certain loaded cars from the works, as was its duty, plaintiff's exit to a safe retreat from the flying débris was cut off. The evidence showed that plaintiff made the blast with full knowledge of where the cars stood and that they obstructed his escape. The Court of Appeals rules that plaintiff was guilty of contributory negligence, and could not recover.⁸

The Court of Appeals of New York holds that an injury to a brakeman while engaged in coupling cars, caused by a co-employee, having charge of an engine, backing it up against cars standing on a siding, with such force as to drive them back upon one of the cars which the brakeman was coupling, is within the risks incident to his employment.⁹

In Massachusetts the Supreme Judicial Court decides that a railroad company is not liable for the negligence of the conductor of a switch-engine who has charge of making up freight trains in its yard, under the statute which relates to accidents due to the negligence of one who has charge or control of any signal, switch, locomotive engine or train upon a railroad.¹⁰

The Supreme Court of Michigan rules that where a passenger, because of his being asleep, is carried past his station, and at the next station attempts to alight without notifying the conductor, and neither the conductor nor the other train hands know that he intends to alight, and he is thereby injured, the carrier is not liable.¹¹

In Michigan a brakeman in charge of a train, after signaling the engineer to proceed, attempted to board the engine when in motion and was injured. In an action against the company therefore he alleged that the step was loose and turned. There was no evidence that the engineer, whose duty it was to see to the step, was incompetent or did not have proper tools to fix the step, or as to how long it was loose, or whether the company had knowledge of its insecurity. The Supreme Court decrees the company not liable.¹²

In Missouri in an action for causing the death of plaintiff's daughter, aged 15 years, it appeared that, although deceased was by statute a trespasser in walking along defendant's tracks, yet many people habitually walked on the tracks at the place of accident. The train was

running more than six miles an hour, in violation of a city ordinance, and no bell was sounded. The engineer saw the girl when about 600 ft. distant, and blew the whistle when within about 35 ft. of her. The evidence was conflicting as to whether the girl, when first seen by him, was walking on the track upon which the train was moving. The Supreme Court holds the railroad liable.¹³

¹ Fielder v. St. L. I. M. & S. R. Co., 18 S. W. Rep., 847.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago, Rock Island & Pacific, quarterly, \$1 per share, payable Nov. 1.

Norfolk & Western, \$1 in scrip on the preferred stock, payable Oct. 28.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Alabama Great Southern, annual, Birmingham, Ala., Oct. 5.

Cincinnati, Lebanon & Northern, annual, Cincinnati, O., Oct. 11.

Cleveland, Cincinnati, Chicago & St. Louis, annual, Cincinnati, O., Oct. 26.

Colorado Midland, annual, Colorado Springs, Colo., Oct. 3.

Denver & Rio Grande, annual, Denver, Colo., Oct. 18. *Evanston & Terre Haute*, annual, Evansville, Ind., Oct. 17.

Housatonic, special, Bridgeport, Conn., Oct. 18, to approve of the lease to the New York, New Haven & Hartford.

Illinois Central, annual, Chicago, Ill., Oct. 12, to consider an increase of stock from \$45,000,000 to \$50,000,000.

Lake Erie & Western, annual, Peoria, Ill., Oct. 5.

Louisville & Nashville, annual, Louisville, Ky., Oct. 5.

Louisville, New Orleans & Texas, special, New Orleans, La., Sept. 30, and annual, Oct. 3, to consider a consolidation with the Yazoo & Mississippi Valley.

Manhattan, annual, New York City, Nov. 9.

Minneapolis & St. Louis, annual, Minneapolis, Minn., Oct. 4.

New York, New Haven & Hartford, annual, New Haven, Conn., Oct. 19.

New York & Long Island, annual, New York City, Oct. 5.

New York, Pennsylvania & Ohio, annual, Cleveland, O., Oct. 12.

Northern Pacific, annual, Mills Building, New York City, Oct. 20.

Ohio & Mississippi, annual, Cincinnati, O., Oct. 13.

Pearl, Decatur & Evansville, annual, Peoria, Ill., Oct. 4.

Pittsburgh & Western, special, Allegheny, Pa., Oct. 14, to consider an increase of stock to \$1,500,000.

St. Paul & Duluth, annual, St. Paul, Minn., Oct. 13.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Roadmasters' Association of America* will hold its next annual meeting at Lookout Mountain Hotel, Chattanooga, Tenn., Oct. 18, 19 and 20, and at the Kimball House, Atlanta, Ga., Oct. 21 and 22.

The *New England Railroad Club* holds regular meetings, at the United States Hotel, Beach street, Boston, Mass., on the second Monday of each alternate month commencing January.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* holds regular meetings on the third Thursday in each month, at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, N. Y.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November. The next meeting will be held on Wednesday, Sept. 28.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at Wesleyan Hall, Bromfield street, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 300, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, Colo., on the second and fourth Tuesday of each month, at 8

o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

The *Tacoma Society of Civil Engineers and Architects* holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.

The *Association of Engineers of Virginia* holds regular meetings at Roanoke, on the second Saturday in each month, at 8 p. m., except the months of July and August.

The *Engineers' and Architects' Club of Louisville* holds regular meetings on the second Thursday of each month, at 8 o'clock p. m., at its rooms in the Norton Building, Louisville, Ky.

American Railway Association.

The fall meeting of the American Railway Association will be held at No. 24 Park place, New York City, on Wednesday, Oct. 12, 1892, at 11 a. m. Reports will be presented by the following committees: Executive Committee, Committee on Train Rules, Committee on Car Service, Committee on Safety Appliances. Three members of the Committee on Car Service and three members of the Committee on Safety Appliances are to be elected.

American Society of Railroad Clerks.

The annual meeting of this Association was held in Philadelphia last week. The following officers were elected for the ensuing year: John B. Treibler, of Philadelphia, President; E. C. Leavenworth, of Grand Rapids, Mich., Vice-President, and Frank L. Solomon, of Boston, Secretary.

American Society of Railroad Superintendents.

Secretary C. A. Hammond has issued the notice of the twenty-first meeting of the Society which will be held at Hotel Brunswick, Fifth avenue and Twenty-sixth street, New York City, on Monday, Oct. 10, at 10:30 a. m.

Among the items on the order of business are: Amendment to the Constitution proposed at last Meeting (see p. 11, *Proc. Twentieth Meeting*). Reception of delegates from the Master Mechanics', Master Car Builders', Roadmasters' and Train Dispatchers' Associations. Election of Officers and two members of the Executive Committee. Report of Special Committee on Signaling. J. J. Turner, Chairman. Paper by the Secretary on "A Method of Drawbridge Protection." Addresses and Discussion on: (a) Experience in Working Under the Standard Code of Train and Telegraph Rules. (b) Methods of Examining and Instructing Railroad Employés. (c) Motive Power. Compound Locomotives. Electric Traction. (d) Progress in adopting M. C. B. Standards. (e) Practical Tests of Railroad Appliances (f) The World's Columbian Exposition.

A cordial invitation is extended to all railroad superintendents, past and present, to attend this meeting, and, if not members, to present their application for membership.

Boston Society of Civil Engineers.

At the meeting of the Society to be held on Oct. 19, the subject for discussion will be "Rapid Transit for Boston and Its Suburbs." Mr. George S. Rice, late Chief Engineer of the Boston Rapid Transit Commission, will open the discussion. Members interested are invited to contribute papers and discussions.

Brotherhood of Locomotive Firemen.

The convention of this society at Cincinnati last week elected officers as follows: Grand Master, F. P. Sargent, of Terre Haute; Secretary and Treasurer, F. W. Arnold; Editor of the *Locomotive Firemen's Magazine*, E. V. Debs, Terre Haute. Mr. Debs "had his wings clipped," says a Western paper. He was not re-elected Grand Secretary, and was stripped of the title of manager of the magazine. He stirred up opposition by too pronounced advocacy of co-operation with the Knights of Labor.

Engineers' Club of St. Louis.

A regular meeting of the Club was held at the club rooms on Sept. 2, President Johnson in the chair, and 26 members and 3 visitors present. Prof. W. B. Potter read the paper on "Water Supplies for Large Cities." The paper described the sources of our water supplies and showed the differences in mineral contents as affected by the nature of the rocks which it met. In the Eastern cities; where the supply passes over the granite rocks the mineral matter is small, while in the West, where limestones and clays are met with, the amount is large. The different methods of filtering were described and their uses shown. The question of oilier scales was noticed and the preventives considered. After mentioning the evil effects due to the presence of large amounts of lime the more important organic impurities were fully discussed. The nature and character of the impurities found in the four classes of water supply, rain, surface, ground and deep water, were dwelt on in detail. A number of tables were exhibited showing the water supplies of the larger cities of the country. Discussion followed by Messrs. Flan, Johnson, Seddon, Potter, Wheeler, Crosby and Russell.

Franklin Institute.

The programme of lectures for the season of 1892-93 is just issued. Some of the lectures are as follows: Friday, Nov. 4—Prof. Lewis M. Haupt, "Ship Canals" illustrated. Friday, Nov. 18—Mr. J. C. Trautwine, Jr., "Movable Dams." Monday, Nov. 21—Mr. George H. Babcock, President Babcock & Wilcox Co., New York. "The Genesis and Exodus of Steam." Friday, Nov. 25—Mr. Eckley B. Cox, Driftwood, Pa., "The Regulation of Wages." Friday, Dec. 2—Mr. James M. Dodge,

¹ Blakely v. Chi., K. & N. R. Co., 51 N. W. Rep., 767.

² Gulf, C. & S. F. R. Co. v. Wash., 19 Fed. Rep., 347.

³ L. & N. R. Co. v. Dies, 18 S. W. Rep., 290.

⁴ Howland v. N. Y., N. H. & H. R. Co., 23 Atl. Rep., A. 755.

⁵ Mexican Coal Co. v. Shean (Tex. Sup.), 18 S. W., 151.

⁶ At. T. & S. F. R. Co. v. Dill, 20 Pac. Rep., 148.

⁷ I. & G. N. Ry. Co. v. McLean, 18 S. W. Rep., 672.

⁸ B. & O. R. Co. v. Keeler, 7 A. 643.

⁹ Monroe v. St. L. I. M. & S. R. Co., 18 S. W. Rep., 26.

¹⁰ Jones v. St. L. I. M. & S. R. Co., 18 S. W. Rep., 26.

¹¹ McAleney v. Williston, 17 N. W., 883.

¹² McLaren v. St. Louis, I. M. & S. R. Co., 18 S. W., 919.

¹³ Dodge v. B. & A. R. Co., 29 N. E. Rep., 1063.

¹⁴ Wilson v. L. I. M. & S. R. Co., 15 S. W. Rep., 638.

¹⁵ Benesney v. N. Y., L. I. & W. R. Co., 30 N. E. Rep., 190.

¹⁶ Thyng v. Fitchburg R. R., 30 N. E. Rep., 190.

¹⁷ Nichols v. C. & W. M. Ry. Co., 51 N. W. Rep., 284.

¹⁸ Miller v. C. & G. T. Ry. Co., 51 N. W. Rep., 370.

"Rope Power Transmissions." Monday, Dec. 12.—Mr. T. Commerford Martin, Editor *Electrical Engineer*, "Electricity in the Modern City" (illustrated). Monday, Jan. 2.—Mr. Pedro G. Salom, "The Storage Battery Question." Friday, Jan. 6.—Mr. W. H. Jaques, Bethlehem Iron Co. "Recent Heavy Development of Heavy Ordnance in the United States." Monday, Jan. 23—Dr. Louis Duncan, Johns Hopkins University, Baltimore, Md., "Electric Power Transmission." Friday, Jan. 27—Prof. H. W. Spangler, "Cheap Power." Monday, Jan. 30—Prof. Joseph W. Richards, "The Specific Heats of Metals." Friday, Feb. 17—Thomas C. Clarke, "Bridging the Hudson and East Rivers." Monday, Feb. 20—Mr. C. Kirchhoff, Editor *The Iron Age*, "Copper Mining in the United States" (illustrated). Friday, Feb. 24—Mr. Nikola Tesla, "An Experimental Study of Light Effects Produced by Alternating High Potentials" (illustrated).

PERSONAL.

—Mr. C. O. Shepherd, assistant general freight agent of the Gulf, Colorado & Santa Fe, tendered his resignation.

—Mr. George B. Ross, master mechanic of the New York, Lake Erie & Western, at East Buffalo, is reported to have resigned on account of ill health.

—Mr. Lafayette Hoxie, Superintendent of the Sebastian & Moosehead Railroad, was killed last week by being thrown from the steps of a car while leaning over to examine a truck spring.

—Mr. Ira A. McCormack, paymaster of the Hall Signal Company at Chicago, has been appointed Train Master of the Lake Shore & Michigan Southern with jurisdiction between Buffalo and Cleveland.

—George J. Gould and Charles M. McGhee have notified President Oakmann that they are unable to accept the places on the Richmond Terminal Board of Directors to which they were reelected at the special meeting in Richmond.

—Mr. George S. Rice and Mr. George E. Evans have opened an office for general consulting practice as civil and hydraulic engineers in Boston. Both these gentlemen are too well known to need any introduction to our readers.

—Mr. W. R. Baldwin, Assistant General Passenger Agent of the Michigan Division of the Cleveland, Cincinnati, Chicago & St. Louis, has resigned. Mr. Baldwin was General Passenger Agent of the Cincinnati, Wabash & Michigan for a number of years until its lease this year to the "Big Four" road.

—Mr. Arthur Brown, Superintendent of the Bangor & Piscataquis road, which was leased by the Bangor & Aroostook in July, resigned last week. He was appointed Superintendent and General Freight Agent of the road in 1876, and was formerly Station Agent and Division Superintendent of the Maine Central.

—Mr. C. S. Mellen, General Manager of the New York & New England, has been tendered the position of Second Vice-President and Traffic Manager of the New York, New Haven & Hartford, and he now has the offer under consideration. Mr. Mellen has been General Manager of the New York & New England since March and was formerly Traffic Manager of the Union Pacific.

—Mr. C. M. Lawler has been appointed Assistant General Manager of the Philadelphia & Reading Railroad, with office at 227 South Fourth street, Philadelphia. Mr. Lawler has been General Superintendent of the Wilimantic division of the road since June, 1887. He is about 52 years of age, and has worked up through all the grades of railroad business as a clerk, station agent, brakeman, conductor, road master, assistant superintendent, division superintendent, superintendent and general superintendent.

—Mr. Charles W. Buchholz, now Civil Engineer of the New York, Lake Erie & Western, has been appointed President and Chief Engineer of the Quaker City Elevated Railroad Co., of Philadelphia. The appointment has already gone into effect and Mr. Buchholz is rapidly closing up his affairs in the office of the Erie. The appointment will be accepted by those who know Mr. Buchholz and his career as an engineer as a thoroughly good one, particularly so as in quite recent times he has given special study to the problems of great city terminals and city transit. He has made elaborate studies in connection with the Buffalo grade crossing matter and with the terminals for the Hudson River Tunnel, and was one of the board appointed to investigate and pass upon the plans for improving the operation of the New York and Brooklyn Bridge. Mr. Buchholz was trained in the German technical schools and entered the service of the Philadelphia & Reading in 1865 as Assistant Engineer, and later was Resident Engineer at Pottstown. Under his direction several branches of the Reading were built. The most important of these was the Sunbury, Shamokin & Lewisburg. In 1884 he left the service of the Reading to take the position of Chief Engineer of the Erie. The title at that time was Engineer of Bridges and Buildings, and later it was changed to Civil Engineer.

—Mr. Henry Pratt, for the last 10 years Treasurer of the Michigan Central Railroad Co., died in New York Sept. 21, of typhoid fever, after an illness of two weeks. Mr. Pratt was born in Chelsea, Mass., in 1838, and when boy of 14 entered the service of the Hudson River Railroad Co. in its general freight office, and remained in the service of that company until the breaking out of the war, when he held a confidential position as clerk of the President and Superintendent. This he left to enlist as a private soldier in the Twelfth New York Infantry, and after the expiration of its three months' term of service he re-enlisted in the Eighty-ninth, when he was made a First Lieutenant in September, 1861, and a Captain in November, 1862. He was wounded at Antietam and resigned Dec. 27, 1862. He afterward became private secretary of Mr. E. B. Phillips, and remained closely attached to him for many years in the different positions which that gentleman occupied, as President of the Michigan Southern & Northern Indiana, of which for a time Mr. Pratt was Auditor, and, after the consolidation of the Lake Shore & Michigan Southern, going with him in 1871, when, as President of the Phillips & Colby Construction Co., he built the Wisconsin Central Railroad, of which, after its completion, Mr. Pratt became Auditor and General Ticket Agent. In 1878 he came to New York as Assistant Treasurer of the Michigan Central; in 1883 he was promoted to be Treasurer. Mr. Pratt was a man of active and inquiring mind,

and his long service had made him very familiar with railroad affairs and the careers of many now famous railroad men, and he was widely respected as a faithful and efficient officer and esteemed as a good citizen and warm-hearted friend. His funeral on the 27th was attended by U. S. Grant Post, G. A. R., and the New York Commandery of the Loyal Legion, and the Sons of the Revolution, of which he was a member. His body was cremated the following morning. Mr. Pratt lost his wife in March, 1891. Two children survive him, a daughter now a young woman and a son yet a youth, who have lived in Southern California for a year past, where Mr. Pratt had hoped to make a home for his declining years.

ELECTIONS AND APPOINTMENTS.

Allegheny & South Side.—The directors of this new road are: William Jenkins, of Pittsburgh, President; George M. Davis, J. Carroll Barr, W. T. Scudder and R. Theophilus, of Pittsburgh; and E. D. Reis and J. F. Kuntz, of Allegheny.

Arkansas Mineral Belt.—The officers and directors of this new Arkansas road are reported to be: C. P. Huntington, President; J. R. B. Moore, First Vice-President; W. H. Toothaker, Second Vice-President; L. Thompson, Secretary and Treasurer; A. P. Fonda, Kansas City, and J. T. Dysart and C. B. Myers.

Chicago & Erie.—John Hawthorne has been appointed Master Mechanic in place of Thomas A. Lawes, resigned. Mr. Hawthorne was formerly Master Mechanic for the Erie road at Hornellsville, N. Y.

Chicago & Great Western.—J. L. Bass has been appointed Fuel and Tie Agent of the company, with headquarters at St. Paul.

Chicago, Milwaukee & St. Paul.—James M. McKinlay, of New York, was elected a director of the company at the annual meeting in Milwaukee, to fill the vacancy caused by the resignation some months ago of George Magoun. The other directors and officers were re-elected.

Connecticut River.—The annual meeting of the stockholders was held in Springfield, Mass., last week. George H. Ball, of Boston, was elected to the vacancy in the directory caused by the death of A. B. Harris. The remainder of the old board was re-elected as follows: John Mulligan, Springfield, Mass.; Oscar Edwards, Northampton, Mass.; Charles S. Sergeant, Brookline; William Wanting, Holyoke; Frederick H. Harris, J. A. Rumrill, Springfield; E. F. Lane, Keene, N. H.; J. H. Aldin, Concord, N. H.; James H. Williams, Bellows Falls, Vt.

Dexter & Piscataquis.—The annual meeting was held in Dover, Me., recently and these directors elected: J. B. Mayo, S. O. Brown, T. F. Dyer, Geo. Fisher, W. D. Snall, John W. Chase, R. D. Straw, F. W. Hill and J. W. Bradbury. The directors elected J. B. Mayo, President and E. A. Thompson, Treasurer.

Engleside.—The directors of the new company are: W. J. Latte, Philadelphia, President; Robert S. Beatty and C. William Bergner, William A. Patton, F. W. Schway, Nathan Spering and John B. Stauffer, Philadelphia.

Fremont, Elkhorn & Missouri Valley.—E. Dawson has been appointed Assistant Master Mechanic, with headquarters at Missouri Valley, Ia. Mr. Dawson has heretofore been foreman of the Council Bluffs shop of the Chicago & Northwestern.

Great Northern.—George W. Buck has been appointed Master Mechanic of the Fergus Falls and Breckenridge divisions, with headquarters at St. Paul, Minn.

Kansas City, Watkins & Gulf.—F. S. Hammond has been appointed General Manager with headquarters at Lake Charles, La. The office of Superintendent, held by J. K. Lape, has been abolished.

Louisville, New Orleans & Texas.—John T. Savage has been appointed Assistant Superintendent of the Riverside division, with headquarters at Greenville, Miss.

Newport News & Mississippi Valley Co.—J. Ross has been made Superintendent of Terminals at Louisville, and W. J. McKee has been made Trainmaster of the Louisville & Paducah divisions of the same road to succeed Mr. Ross. Mr. McKee was formerly Division Superintendent of the Louisville, New Orleans & Texas.

New York, Ontario & Western.—At the annual meeting in New York City Sept. 28, the following directors were elected: Thomas P. Fowler, Francis R. Culbert, Charles S. Whelen, Richard Irvin, John B. Kerr, Joseph Price, H. Pearson, William H. Paulding, Charles J. Russell, Albert S. Roe, Eben K. Sibley, Edward B. Sturges, Gerald L. Hoyt. The new directors are Gerald L. Hoyt and Edward B. Sturges, who take the places of John Greenough and Samuel Barton. After the stockholders' meeting Thomas P. Fowler was re-elected President, Joseph Price, Vice-President; John B. Kerr, Vice-President and General Counsel; Richard D. Rickard, Secretary and Treasurer, and Barrow, Wade, Guthrie & Co. Auditors.

Orford Mountain.—At the annual meeting the following directors were elected: Judge Foster, J. N. Green-shields, Q. C.; Capt. J. M. Browne, G. Stevens, P. Murphy, A. F. Robinson, Dr. DeGrosbois, Capt. Warne and W. H. Robinson. Judge Foster was elected President and General Manager; Capt. Warne, Vice-President, and G. Stevens, Secretary-Treasurer.

Oscawana & Cornell.—At a meeting of the directors of the company held at the offices of Messrs. Root & Clarke, No. 32 Nassau street, New York, last week, the following officers were elected: William H. Gale, President; Isaac B. Noxon, Treasurer; A. S. Houghton, Secretary; Oliver W. Barnes, 57 Broadway, New York, Chief Engineer; Root & Clarke, counsel. The road has been described in previous issue.

Ottawa, Waddington & New York.—At the annual meeting of the company, held in Ottawa, Ont., the following officers were elected: C. Odell, C. E. of Montreal, President; Dr. W. J. Anderson, of Smith Falls, Ont. Vice-President; John McCracken, of Ottawa, Sec'y and Treasurer; T. C. Keefer, A. Farling, J. B. Alderson and J. K. Reddington, directors.

Sabine Pass, Alexandria & Northwestern.—The directors of this new Texas road are: Ex-Governor R. B. Hubbard, J. D. Moody, J. B. Douglas, F. L. Mansfield and Ben B. Cain, with R. H. Brown, C. Willis and W. C. Scott, all of Tyler, Tex.

Salt Lake & Los Angeles.—The Company held its second annual meeting in Salt Lake City last week. These

officers and directors were re-elected: President, George Q. Cannon; Vice-President, Joseph F. Smith; other directors, Wilford Woodruff, James Jack, N. W. Clayton. I. A. Clayton was chosen Secretary and Treasurer, and N. W. Clayton General Manager.

Savannah, Americus & Montgomery.—W. J. Matthews, heretofore Superintendent of Transportation, has been appointed General Superintendent of this road, with headquarters at Americus, Ga.

Savannah, Florida & Western.—A. P. Lane has resigned as Soliciting Agent of the Central of Georgia, at Boston, and been appointed Agent of the Plant System at 208 Washington street, Boston, vice O. G. Pearson, resigned.

Toledo, St. Louis & Kansas City.—Samuel R. Callaway has been re-elected President of this road; W. Howard Gilden, Treasurer, and Martin L. Crowell, Assistant Treasurer and Secretary.

Weiser & Northern.—The following officers have been elected: T. C. Galloway, President; G. W. Waterhouse, Vice-President; W. T. Somercarp, Treasurer, and T. A. Clark, Chief Engineer, Weiser, Idaho.

RAILROAD CONSTRUCTION, INCORPORATIONS, SURVEYS, ETC.

Allegheny & South Side.—This company was incorporated in Pennsylvania last week. The new road is to begin at a point in the city of Allegheny, Pa., near Spruce street, and the Ohio River, to a point in the Twenty-sixth Ward of Pittsburgh, connecting with the Monongahela Connecting Road at South Twenty-fourth street. The length of the road will be five miles, and the capital is \$50,000. William Jenkins, of Pittsburgh, is president.

Arkansas Mineral Belt.—The charter for this company was filed in Arkansas this week. The road will begin at Little Rock and extend northward through the counties of Pulaski, Faulkner, White, Cleburne, Van Buren and Stone to the north line of Baxter County. It is intended further to extend the line to West Plains, Howell County. The length of the line in Arkansas will be 150 miles, and 25 miles in Missouri. The capital stock is \$3,500,000, of which \$200,000 has been subscribed. A. P. Fonda, of Kansas City, is one of the directors.

Bayfield Harbor & Great Western.—The franchise and other property of the Bayfield, Lake Shore & Western has been purchased by W. F. Dalrymple, of Bayfield, President of this company, who says the road will now be pushed to completion from Bayfield, Wis., to the connection with the Northern Pacific.

Balden Point.—The company was incorporated this week at Albion with a capital of \$30,000 for the construction of a road to be operated by steam or electric power, from the New York, New Haven & Hartford, in Westchester County, between Westchester and Bartow, to City Island. The directors are John G. Hyatt, P. D. Sturgis, V. Smith and Andrew Mitchell, of New York City, and William Belden, of City Island.

Canadian Pacific.—The company has commenced extending its track along Dalhousie street in Quebec, Que., on the river front to the market wharf. It is said that the company intends to make other extensive improvements in the vicinity of the new hotel now being built.

Chesapeake & Ohio.—This road is building a two-mile switch or branch line to connect its main line in the Kanawha Valley with the several new factories of the new town of Kanawha City, W. Va.

Chicago Central.—This branch of the Chicago & Northern Pacific Terminal System from the junction of the main line at Ogden avenue and Twelfth street, Chicago, south to Blue Island, will be opened on Oct. 1 for rapid transit travel. The new road was practically completed in July, and is over 11 miles long, being double tracked for nearly eight miles.

Chicago Elevated Terminal.—A company of this name has been organized at Chicago by Walter C. Gunn, Paul Brown, John H. Miller, William G. Adams and A. Gillespie.

Columbia & Puget Sound.—The Maple Valley extension is being rapidly built and the only difficulty is in securing a large number of men for the work. The clearing has been entirely completed along the right of way and grading as commenced and will be pushed with all due speed. The road will be finished by Dec. 1, the contract time, from Maple Valley, Wash., to the Denny coal mines.

Duluth, South Shore & Atlantic.—Henry & Balch, the contractors who are building the new line from Iron River to West Superior, Wis., are experiencing considerable difficulty in getting laborers and tracklayers. They say they could employ 500 additional men if they could get them. Tracklaying has been begun.

East Line & Red River.—That part of this road between Greenville and Jefferson, Tex., a distance of 122 miles and heretofore operated as a narrow gauge road, was changed to standard gauge on Sept. 13 by the Southwestern Co., of Milwaukee, Wis., principal contractors. This makes the entire line from McKinney to Jefferson, Tex., a distance of 153 miles, a standard gauge road.

East & West of Georgia.—E. A. Rozier, Secretary of the company, states that the company will build a road from Davisboro to Sparta, and thence to White Plains. Surveying has been commenced and grading will soon start.

Fairmont Belt Line.—The contract for grading this road, mention of which was made in last week's issue of the *Railroad Gazette*, has been let to Isaac Steets of Parkersburg, W. Va., with orders to begin work at the earliest possible day.

Fairmont, Morgantown & Pittsburgh.—Work on the Morgantown extension is now being pushed with all possible rapidity. Lane Brothers who have the first six miles of the work, which is the heaviest, have increased their forces one-half in the hope of getting the work done by Nov. 1. The work on the other contracts is so well along that it is believed that it will be done by the same date. After the grading is completed the line is to have 10 in. of ballast before the rails are laid. The Cheat River bridge mentioned last week is expected to delay the final completion of the road considerably, though there is talk of making a transfer ferry at that point. The new line from Morgantown, W. Va., northeast to Uniontown, Pa., is 28 miles long.

Great Northern.—There are at present over 7,000 men at work on the Pacific extension. Shepard, Siems & Co. have over 4,000 east of the summit of the Cascade mountains and are pushing the work night and day. Ever since the contractors passed the Rockies they have worked at night, principally in rock cuts. "We were right in the timber," said Mr. Siems, "and carried on the work by light from bonfires and torches." Both grading and track laying are progressing satisfactorily and the aim is to complete the track to the summit of the Cascades before heavy snow interferes. All of the grading for the switchback on the Eastern slope will be done before Oct. 15. The number of teams employed in grading is not as large, on account of the nature of the work, as it has been, but there is now an unusually large number engaged in hauling supplies to the front. Between the summit of the Cascades and Puget Sound, Shepard, Henry & Co. have about 3,000 men at work, and they also expect to get through ahead of the heavy snow. The contractors are now paying from \$2 to 2.25 to laborers, and have paid \$2 nearly all the time since they began the work.

The surveys of the extension from Park Rapids to Leech Lake, Minn., have been completed, as already noted, but the line will not be built until next Spring, as it is impossible for contractors to find enough men to carry on the work now under way in Wisconsin, Minnesota, and the Dakotas.

Iowa Central.—General Manager C. H. Ackert, in the latest annual report, recommends that the grades between Oskaloosa and Mason City, Ia., be reduced to a maximum grade of about 47 ft., being now 78 ft. An estimate was made for this work a few years ago, and it would cost \$375,000.

Jacksonville, St. Augustine & Halifax River.—Louis McLain, of Savannah, who is the principal contractor for the extension to Rockledge, Fla., began the track laying south of New Smyrna on Sept. 10, and he expects to lay one mile of track daily until the work is completed to Rockledge. The extension is about 85 miles long from Daytona, and practically the entire line is now graded to the Indian River near Rockledge.

Jacksonville & Southeastern.—A committee of citizens of Galesburg, Ill., has secured the right of way through that town for the extension of this road. President Hook has informed the committee that he proposed to build to that town and the location had been made, but that he had decided not to extend the road this year beyond Canton, Ill., which is about 18 miles north of Havana, the present terminus.

Kanawha & Michigan.—The grading and masonry on the Edgewater end of this road's Kanawha Valley extension is being pushed rapidly, and it is expected it can be finished by Nov. 1. The line is being built by J. S. Casement & Co., of Charleston, W. Va., and is 32 miles long from Malden to the Gauley River.

Kansas City, Nevada & Fort Smith.—The officers announce that all the right of way needed for the extension through to Pittsburgh, Kan., a distance of about 50 miles, has been secured and that they expect to build the line to that point early in January. The grading is nearly complete on the 18 miles south of Hume, Mo., and it is expected to have trains running into Clayton, where a connection is made with the Missouri, Kansas & Texas, by Nov. 1.

La Porte, Houston & Northern.—The contractor reports the grading practically completed from La Porte on Trinity Bay northwest to Harrisburg, Tex., about 14 miles. Connection will be made at that point with the International & Great Northern for the present, but it is proposed to build an independent line into Houston, 20 miles from La Porte, in the immediate future. T. J. Collins, of Houston, the contractor, is now building the bridges.

Minneapolis, St. Paul & Sault Ste. Marie.—Linton & Co., of Minneapolis, who have the contract for building the northwestern line from Valley City, N. D., to the international boundary line, state that they will sublet the grading on the new line, which is about 150 miles long. Their headquarters are at Valley City.

Missouri, Kansas & Texas.—The tracklaying on the branch from Lockhart east to Smithville, Tex., was to have been completed this week, and regular trains will be run over the new line immediately from Smithville, the junction on the main line, to San Marcos. The contractors will remove the men who have been working on this line to the Houston branch and the tracklaying will be commenced at Boggy Tank, towards Sealy and Houston, which is expected to reach in December. The grading has been completed for about 40 miles east of Boggy Tank and the rails have been delivered for this section.

Montana Central.—The company is now busily repairing the damage done by the storms last month on the line between Helena and Great Falls, Mont. The grade is being raised at certain points where the high water overflooded the embankments and truss spans are being put in, replacing the short pile structures, at the same time giving larger water ways. The road follows the Missouri River between these points, and where there was formerly insufficient channel along the side of the roadbed the location is being changed to give room for the stream. The slopes are being well protected with slope walls.

New Roads.—The Castle Rock Coal Co. has let a contract to King & Dickinson, of Tacoma, for the construction of 2½ miles of road from Castle Rock, Wash., to its mines in the mountains.

A road is proposed from Midland City, Henry County, Ala., to Abbeville, the county seat, and an effort is being made to secure subscriptions of \$25,000 in Abbeville to aid in building the road.

A number of capitalists are forming a company to construct a road from St. Lin, northwest to Joliette, Que., 20 miles. Subscription lists have been circulated and the parish of St. Jacques has already subscribed a considerable sum. A charter will be applied for from the next Provincial Legislature.

Norfolk & Western.—Tracklaying on the Ohio Extension was completed on Thursday, Sept. 22, two days sooner than was anticipated; the junction point of the tracklaying forces being about midway between Portsmouth and Hatfield, W. Va. The first through train to pass over the road was that of Vice President and General Manager Joseph H. Sands, which went over the new line on Sept. 24 and 25, leaving Bluefield on the morning of the first date, and arriving at Kenova in the afternoon of the latter. It is expected that the road will be open for traffic, both passenger and freight, by Nov. 1. The company has been laying track for some time past, from both directions, and

the forces joined at a point 81 miles from the Pocahontas coal fields and 103 miles from Kenova, on the Ohio River. At the latter point the line crosses the Ohio River bridge, opened for traffic in November, 1891. The company now has a direct through line from Norfolk, Va., to Columbus, O., a distance of 707 miles. The official announcement of the completion adds that "the road opens up the port of Norfolk and southwest Virginia to the Northwest, and will be the means of bringing shipments of grain, provisions and general merchandise from the North and West to Norfolk, the distance via this line from Norfolk to Chicago being 1,020 miles. This line will also place the Pocahontas coal fields and the new Kenova coal fields in connection with the North and West for coal and coke."

North Galveston, Houston & Kansas City.—The contract for building the 16 miles of road between Virginia Point, on the west side of Galveston Bay, to North Galveston, was recently awarded to J. H. Barrett, of Corpus Christi, Tex., and the work was commenced on Sept. 17. The line between North Galveston and Virginia Point has been located and this section is to be completed by Nov. 25. The grading will be very light, with maximum grades of 10 ft. to the mile and maximum curves of four degrees. The only bridge work will be the construction of a trestle 1,000 ft. long, with a swing span 150 ft. long, over Dickinson Bayou, and the Youngstown Bridge Co. has the contract for the draw. The money has been subscribed to build and equip the 16 miles of road now under construction. The projectors also propose to build a line from North Galveston, northeast to Beaumont, a distance of 60 miles. They state that 52 miles of this work will be light prairie grading, but it will be necessary to trestle the eight miles beyond Galveston Bay, between Galveston and Smith's Point. They propose to build the bridge with three draw spans, but then they add that no estimate of the cost of the structure has yet been prepared. S. F. Menage, of Minneapolis, is President and L. F. Nadeau, of Galveston, General Manager.

Old Colony.—The Massachusetts Railroad Commissioners gave a hearing this week on the petition of the company for a certificate of exigency for the construction of a branch from Sherborn, through the towns of Sherborn, Natick, Dover, Wellesley, Needham and Boston, to a point on the West Roxbury branch. Civil Engineer Rollins stated that it would be 12 miles in length, and the cost would be \$96,171 per mile, or \$1,180,000 for the road completed.

Omaha & South Texas Land Co.—About 300 men are employed by this company in building a road to Houston Heights, some three miles from the city of Houston, Tex. About a mile of the line has been completed, and Chief Engineer Hengen states that all the right of way has been obtained. The motive power for the road has not yet been determined upon.

Ottawa, Arnprior & Parry Sound.—Construction is being pushed rapidly forward on this road, about 500 men being now employed. The rails are laid west of Ottawa as far as the Cedar bridge in the township of Admasar, Ont., where there is considerable trestle work. It is said that this will be finished this week and the rails will then be laid as far as Douglas, as it is expected that the grading to that point will be completed by that time. The road is being ballasted as far as the rails are laid. The line is being cleared west of Douglas, and the grading will commence this week.

Philadelphia & New England.—Stephen Holmes, of Stroudsburg, Pa., who is the President of the Pennsylvania Division of this proposed road, states that the locating survey has progressed for a number of miles beyond Stroudsburg, Pa., toward Port Jervis, N. Y. The line follows the Delaware River the entire distance of 42 miles, passing through Bushkill, Egypt Mills and Milford. A branch is proposed from Stroudsburg south to Saylorsburg, Pa., 10 miles. J. E. Bloom, 194 Broadway, New York, is the promoter of the project.

Portland & Rumford Falls.—Propositions for the construction of a line from Mechanics Falls, Me., the southern terminus, southeast to a connection with the Maine Central between Danville Junction and Auburn, will be received at 31 Exchange street, Portland, Me., until Oct. 8. Frederic Danforth is Chief Engineer.

Portsmouth (Va.) Belt.—W. C. Furber is surveying a belt road to be built by the Portsmouth Co., J. H. Dingee, President, 333 Walnut street, Philadelphia. The line will be nearly five miles long, and connects the Norfolk & Western with the Seaboard & Roanoke and the Atlantic & Danville, thus giving an entrance into Portsmouth.

Powellton & Pocahontas.—The extension which the company has recently undertaken is only two miles from Powellton, W. Va., instead of being many times that length, as former reports indicated. The road now being operated is five miles long, extending from Mt. Carbon on the Chesapeake & Ohio southwest to Powellton. Surveys have been made for an additional five miles and it is proposed to continue the location to a connection with the Ohio extension of the Norfolk & Western. Evan Powell is President and David T. Evans Secretary, of Powell, W. Va.

Providence & Springfield.—Work on the long-delayed eight mile extension to connect with the New York & New England at East Thompson, Conn., was begun at Pascoag, R. I., this week. Six hundred men will be put to work, and it is expected to have the line in operation by next April.

Sabine Pass, Alexandria & Northwestern.—The charter of this company was filed in Texas last week by ex-Governor R. B. Hubbard and others, of Tyler, Tex. The road is to extend from Sabine Pass, in Jefferson County, to a point on the southern extension of the Chicago, Rock Island & Pacific in Wise County, Tex.

St. Catharines & Niagara Central.—President L. S. Ollie of this road is circulating a petition at Hamilton, Ont., asking the city council to submit to the citizens of Hamilton a by-law to subscribe \$125,000 for the extension of the road from St. Catharines west to Hamilton.

St. Paul & Duluth.—The work of reducing grades at Brown's Hill and the Stacy hill has been completed. Two cuts are now being made at Coffie's Hill near Moose Lake, Minn. One of the cuts is 6 ft. and the other 12 ft., and, when completed, will have reduced the grade to 20 ft. per mile.

San Francisco & Clear Lake.—This company has been incorporated in California to build a road from a point on San Francisco bay through Napa and Lake counties to Clear Lake. The estimated length of the road is 90 miles. Ten per cent, (\$9,000) of the subscribed

stock has been paid in. The directors for the first year are C. Brodburst, J. W. Eisenmuth, Green Majors, G. V. Lodge and E. M. Green.

Seattle, Lake Shore & Eastern.—An engineering party started out last week under Assistant Engineer Kyle, of the Northern Pacific, to survey a line for an extension of this road to the Denny iron mines. The survey was begun at the present northern terminus at Sallal Prairie, Wash. The line will probably follow the Snoqualmie Valley for the greater part of the distance.

Sioux City, Chicago & Baltimore.—The projectors announce through the local press that 10 miles of the new road will be built southeast from Sioux City this fall to the Missouri River bluffs line. Early in the spring work will be begun on a section of 30 miles of road through the bluffs and across the Little Sioux River to the western line of Woodbury County.

Slaughter Creek.—The organization of this company in West Virginia has been already referred to. The new road is projected to develop coal fields on Slaughter Creek owned by C. Adolph Low, of 41 Liberty street, New York, and others, and it is proposed to build only five miles of road at the present time from a point on the Kanawha River, near Peirce, W. Va.

Snow Fork & Hocking.—It was reported last week that the right of way at Athens, O., and through the Floodwood coal fields, has been finally secured after long litigation. The road is being built as a branch of the Baltimore & Ohio, about 15 miles long, through the Hocking Valley coal fields, and most of the grading has been completed.

Southern Pacific.—This company has completed a branch 1½ miles long into Lake Charles, La., which will avoid the necessity of using drays for the transportation of freight from the town to the main line of the road.

Spokane Falls & Northern.—The grading on the four mile extension from Little Dalles north to Northport, Wash., on the Columbia River, was completed early this month and, as the tracklaying was begun some days ago, it is expected to complete the work this week.

Stuttgart & Arkansas River.—H. G. Leslie, of De Witt, Ark., who is the contractor for this road, is now building an extension of about 10 miles south of De Witt toward Pendleton on the Arkansas River. About five miles of the new line has been completed and it is expected to finish the entire 16 miles in a short time. A trestle 600 ft. long is being built, but the rest of the work is very light. Funds for the extension have been obtained in Providence, R. I. F. M. Gillett, 5 Wall street, New York City, is the Eastern representative.

Weiser & Northern.—The route of this road, recently incorporated in Idaho, is given as from Weiser, Idaho, north up the Weiser River to Middle Valley, Salubria and Council Valley, thence via Hornet Creek to the copper mines of the Seven Devils. Surveys have been made as far as Council Valley, a distance of 58 miles. Representatives of New York firms are expected to arrive at Weiser in a few days to go over the route. The new line will open a good timber, mineral and agricultural country, which is well populated. T. C. Galloway, of Weiser, is President.

Yakima & Pacific Coast.—The branch of the Northern Pacific to South Bend, Wash., which is being built under this title, will probably be in operation to that city about Nov. 1. The grading has been finished to Francis station, about 6½ miles west of the summit, where a large cut delayed the work. There is now only four miles of the road that has not been graded. The heaviest work has been done and the tracklayers are only a short distance behind the graders. Track has been laid across the summit of the mountain, and is now progressing rapidly, about 400 men being engaged on the work. The distance to South Bend is about 22 miles.

GENERAL RAILROAD NEWS.

Addison & Pennsylvania.—An agreement of consolidation between the Addison & Pennsylvania Railroad Company, a Pennsylvania corporation, and the Addison & Pennsylvania Railway Company, of New York State, forming the Addison & Pennsylvania Railway Company, was filed with the Secretary of State at Albany, Sept. 28. The officers of the consolidated company are: President, T. C. Platt; Vice-President, William Brookfield; Treasurer, Frank R. Winne; Secretary, James E. Jones. The roads are already operated as one line.

Baltimore & Ohio.—The statement of earnings for August is as follows:

	1892	1891	In. or Dec.
Gross earn.....	\$2,345,221	\$2,372,158	D. \$27,135
Oper. expen.....	1,580,492	1,507,335	L. 73,156
Net earn.....	\$774,529	\$861,823	D. \$100,291
<i>Two months:</i>			
Gross earn.....	\$4,431,578	\$4,591,235	D. \$159,657
Oper. expen.....	3,144,728	3,022,868	L. 112,860
Net earn.....	\$1,286,850	\$1,568,367	D. \$278,517

Central of Georgia.—A committee consisting of E. Rollins Morse, of Boston, E. Dennison, of Philadelphia, F. M. Colston, of Baltimore, C. A. Phinizy, of Georgia, and J. T. Woodward, Emanuel Lehman and H. B. Hollins, of New York, has been organized to propose a plan for the reorganization of the company. The committee intends to form a syndicate that will furnish the money necessary to pay off the loan of Speyer Bros., amounting to about \$3,700,000, and to take the road out of the receiver's hands.

Georgia Southern & Florida.—A meeting of the bondholders was held in Baltimore last week and about \$500,000 of the bonds were represented. A resolution was adopted asking the Georgia court to refuse to issue receiver's certificates at eight per cent. for five years, as requested by the Receiver, for the purpose of paying the defaulted interest of July amounting to \$102,000, \$16,000 for betterments, and \$400,000 for extension of the road from Tifton to Thomasville, Ga. The meeting asked for the removal of Receiver Sparks, and directed the trustee, the Mercantile Trust Co., of Baltimore, to foreclose the mortgage.

Chesapeake & Nashville.—This road was sold at public auction at Nashville, Tenn., Sept. 27, to satisfy a decree of the United States Court against the road in favor of the Mississippi Valley Construction Co. The road was purchased by Mr. A. R. Weber, of New York, for the construction company, through his attorney, Scott Cummings, of Memphis. The amount paid was

\$310,000. The road is in operation from Gallatin, Tenn., to Scottsville, Ky., 35 miles.

Chesapeake & Ohio.—The statement of earnings for August, including controlled roads, is as follows:

	1892.	1891.	Inc. or dec.
Gross earn.....	\$3,720,196	\$3,161,839	I. \$58,356
Oper. expen.....	2,348,937	1,817,300	I. 531,628
Net earn.....	\$1,371,269	\$1,354,530	I. \$26,728
Fixed charges.....	\$10,000	795,186	I. 14,813
Surplus.....	\$561,259	\$549,344	I. \$11,915
<i>Eight months.</i>			
Gross earn.....	\$25,171,172	\$20,632,921	I. \$4,478,250
Operating expen.....	17,039,113	13,200,306	I. \$3,838,804
Net earn.....	\$8,132,059	\$7,402,613	I. \$639,446
Fixed charges.....	6,480,000	6,361,489	I. 118,511
Surplus.....	\$1,622,059	\$1,131,124	I. \$520,935

Illinois Central.—The annual report for the year ending June 30 last, just issued, gives the gross receipts of the company from the operation of 2,884 miles of road as \$19,291,770, against \$17,881,555 during the preceding year, an increase of \$1,410,205. Expenses and taxes amounted to \$14,070,018, an increase of \$1,308,973, and the net earnings were \$5,221,740, an increase of \$101,232. The net income from all sources amounted to \$4,407,438, out of which was paid interest and rental to the amount of \$3,932,105, leaving \$2,475,333. Dividends aggregated \$2,250,000, leaving a surplus of \$225,333.

Louisville & Nashville.—Regarding the rumors of an approaching sale of four per cent. bonds, Chairman August Belmont has issued a statement saying: "The unified four per cent. bonds of the Louisville & Nashville in the treasury of the Nashville, Chattanooga & St. Louis were paid to that company in August, 1891, and it was made public at that time, when the Louisville & Nashville had the option for a year to purchase the same at 80 and interest, the price paid. The Louisville & Nashville received, as the majority stockholder, its proportion of the Nashville, Chattanooga & St. Louis stock, which was increased at that time, and which has ever since paid regular dividends at the rate of five per cent. per annum and is certain to earn the same this year. The Nashville, Chattanooga & St. Louis has no intention at present of selling the bonds. As to additional issue of unified four per cent. bonds, I simply reiterate the statement that on Jan. 1, 1892, there were appropriated by the company \$1,000,000 for improvement, \$1,000,000 for equipment, and \$566,750 for the sinking fund, which expenditures were represented by unified four per cent. bonds, all of which have practically been sold. No bond issue of any kind is pending."

Nashville, Chattanooga & St. Louis.—The company reports gross earnings for the year ending June 30 of \$5,343,257, an increase of \$1,400,983 as compared with the previous fiscal year, and net earnings of \$2,029,007, an increase of \$400,425. Other income was \$31,886, making total income \$2,060,893. Fixed charges were \$1,988,639, an increase of \$597,785, leaving a surplus of \$72,254, a decrease of \$193,066.

New York, New Haven & Hartford.—The annual report for the fiscal year to June 30 shows the gross earnings as \$12,102,930; operating expenses, \$8,273,010, net earnings, \$2,162,280. During the year dividends were paid which aggregated \$2,103,750. This leaves a surplus for the year of \$58,530. Total train mileage, 8,175,797. Total number of passengers carried, 14,658,906. Average rate of fare received from all passengers, 1.7 cents a mile. Total number of tons of freight carried, 4,120,477. Average rate per ton per mile received on all freight 1.75 cents.

Old Colony.—At the annual meeting of the stockholders Sept. 27 the stockholders authorized the directors to lease the Providence, Warren & Bristol road; to operate the Plymouth & Middleboro road, and abolish all grade crossings between Roxbury and Hyde Park, paying 55 per cent. of the cost of doing the same. They also authorized the directors to subscribe for new stock of the Old Colony Steamboat Co., and to issue bonds to the amount of \$2,000,000. The auditor's report showed gross earnings for the year, \$8,734,812 and net earnings of \$2,050,425. The board of directors was re-elected.

Pennsylvania.—The statement of the business on all lines east of Pittsburgh and Erie, for August, as compared with the same month in 1891, shows an increase in gross earnings of \$14,232; an increase of expenses of \$240,749, and a decrease in net earnings of \$226,000. The eight months of 1892, as compared with the same period of 1891, show an increase in gross earnings of \$1,333,163; an increase in expenses of \$1,302,244; a decrease in net earnings of \$759,061. All lines west of Pittsburgh and Erie for August, as compared with the same month in 1891, show an increase in gross earnings of \$190,068; an increase in expenses of \$219,251; a decrease in net earnings of \$29,183. The eight months of 1892, as compared with the same period of 1891, show an increase in gross earnings of \$2,462,051; an increase in expenses of \$2,609,212; a decrease in net earnings of \$147,161.

Philadelphia, Newtown & New York Connecting.—The company was formally merged with the Philadelphia, Newtown & New York road last week. The road was organized this year by the Philadelphia & Reading to construct a line about 1½ miles long, to extend from Tabor Station, on the Bethlehem branch of the Philadelphia & Reading, to Erie Avenue station, on the Philadelphia, Newtown & New York line.

Philadelphia & Reading.—The statement for the month of August shows gross receipts of \$2,022,646; gross earnings, \$1,008,348; net receipts from other sources, \$17,819, leaving a profit for the month of \$1,032,117. From this is deducted \$10,222, expenditures for permanent improvements, and \$625,000 as one-twelfth of the current year's fixed charges, leaving a surplus of \$306,865, an increase of \$49,514 compared with the month of August, 1891. The statement of business of the Philadelphia & Reading Coal and Iron Co. for the month of August shows: Gross receipts, \$1,971,337; gross expenses, \$1,824,918, including colliery improvements, \$81,786.98, and permanent improvements, \$8,906, leaving a profit from mining of \$146,410. From this is deducted \$68,000 as one-twelfth of current year's fixed charges, leaving a surplus of \$78,419, an increase of \$63,712, compared with the month of August, 1891. The result of the operation of the Lehigh Valley Railroad for the month of July shows: Receipts, \$1,723,652; expenses, \$1,174,915, leaving net earnings of \$548,737, an increase of \$80,184 compared with the month of July, 1891.

Pittsburgh, Wheeling & Kentucky.—The management of this company, in which the city of Wheeling,

and Ohio County, W. Va., are large stockholders, have for several years been trying to induce the City Council of Wheeling to give the company the privilege of occupying a small portion of the public wharf with a new passenger station that it is the intention to erect. The plans have been completed for the new station which will cost over \$50,000, but it will be necessary to occupy a part of the public wharf, now unused by the steamboat men, or move the location of the station far from the point which is now occupied by the one now in use. The company is so situated that it cannot buy more private ground, and it must either have a part of the wharf or defer building the station. At a meeting of the City Council committees held last week it was decided to recommend that proposals of the company be not granted, and that means that it will be compelled to continue to use the present station which is entirely inadequate or go out of the middle portion of the town to get ground for its station. It is reported that a plan is on foot to connect the Pittsburgh, Wheeling & Kentucky tracks with those of the Wheeling Bridge & Terminal Company and use the union station of that road.

Western Maryland.—President J. M. Hood has published an open letter concerning the West Virginia Central & Pittsburgh's attempt to secure control of the Western Maryland property. Messrs. Davis, Elkins, and their associates hope to get five representatives in the Board of Directors by virtue of the stock which they have bought. Mr. Hood says: "Of the entire 13,000 shares of the capital stock of the company Baltimore City owns 4,000, Washington County 2,200, and individuals 7,495. Of the latter Messrs. Davis *et al* control enough, so that if they could get the city's proxy in the stockholder election they could probably get enough of the eight political appointees to give them a majority in the board." Mr. Hood says further: "When it is considered that the Western Maryland stock held in the West Virginia Central interest has cost less than \$50,000, while the city's interest in the road has cost over \$7,500,000—that is, when the former is a little more than one-half of 1 per cent. of the latter—it is not clear upon what reasonable grounds the West Virginia Central people can expect a single director in a board of thirteen."

TRAFFIC.

Traffic Notes.

The Colorado roads have made a rate of 1½ fare for the round trip to a convention of churches, a somewhat odd fraction.

The directors of the Missouri Pacific voted on Tuesday to withdraw from the Western Traffic Association, and the Wabash has done the same.

The rate on sugar in carloads from San Francisco to Colorado points has been reduced from \$1 per 100 lbs. to 75 cents, to meet the competition from Philadelphia.

The Great Northern has issued a circular making the demurrage rate \$3 a car for each day after 24 hours. This was the rate during the busy season last year.

Witnesses and jurors attending the United States courts in Colorado will hereafter be allowed 5 cents a mile for railroad travel and 15 cents when they go by stage coach or carriage. The latter rate has heretofore applied on railroads also.

The Erie's six-dollar tickets from New York to Buffalo are good until Oct. 10, which is the time limit of the G. A. R. excursion tickets, whose misuse caused the reduction in the regular rates. It is stated this week that the Delaware, Lackawanna & Western has agreed to withdraw Buffalo tickets from the brokers' offices. No reduction has been made in the eastbound rates between Buffalo and New York.

Chicago Traffic Matters.

CHICAGO, Sept. 28, 1892.

The Monon has met the rate of 87.50 to Nashville, made by the Chicago & Eastern Illinois, and has authorized it as a basing rate to the Western lines. The Pennsylvania has tendered the cut rate of \$3.50 from Louisville and Cincinnati to Chicago as a basing rate to all points west.

The Western lines have agreed to extend the limit of summer tourist tickets to Portland, Or., from six to nine months.

The Chicago-St. Paul lines will join the Michigan Central in meeting via Chicago the rate of \$33 made by the "Soo" line to Minneapolis and St. Paul for Sept. 30 and Oct. 1 from Canadian points.

The Chicago lines are beginning to make arrangements to remove a part of their freight business from their present city terminals in order to relieve their tracks, in anticipation of the increased passenger traffic next year. The Rock Island has commenced to arrange for tracks at Blue Island, and the Baltimore & Ohio is doing the same at Wo'l Lake, near the Indiana State line.

Armour & Co. have filed bills in the United States Circuit Court against the Philadelphia & Reading for \$49,997; Delaware, Lackawanna & Western, \$10,743; Delaware, Hudson, \$9,617; Fitchburg, \$10,743; Baltimore & Ohio, \$15,225; West Shore, \$9,617, all on account of alleged overcharges on dressed beef several years ago.

Chairman Midgley has succeeded in getting the S. & W. lines to raise their westbound rates from New York 10 cents and to promise further advances after navigation closes. This does not, however, relieve the situation as well as was expected. He was not able to accomplish anything with the "Soo" line, the Canadian Pacific not being disposed to restore rates.

The lake and rail lines have agreed to advance their rates to correspond with advances made by the all rail lines Oct. 10, and will abolish all commodity rates.

Some of the Western roads have been accepting shipments of packing-house products from South Omaha as "part of lot," and billing them at carload rates. Chairman Midgley has ordered that this practice be discontinued and that hereafter either less than carload rates be charged or the consignment be billed at the minimum weight of 20,000 lbs. at the carload rate. Another practice which he has ordered discontinued is the billing of two or more shipments in the same car consigned to different parties at the carload rate, regardless of minimums.

At different times the roads in the Western Traffic Association have attempted to secure the consent of the Commissioners for the allowance of drayage at points where they were not able to compete with their competitors on equal terms. The latest instance was an appeal by the Union Pacific to be allowed to pay drayage at Fort Morgan, Col. In denying this application, the Commissioners say:

Fort Morgan is situated on the line of the Burlington & Missouri River in Nebraska, and on the south side of the

Platte River. The line of the Union Pacific is on the opposite side of the river, and its station, which was formerly known as Dewey, is now called Fort Morgan. The rules of the Trans-Missouri Association permit the absorption of a drayage charge at junction points where switching facilities are not afforded, but do not authorize the payment of drayage or the equalization of the expense of drayage to and from stations where there is no intersection of tracks, or between depots and industries or business houses which are not located on the tracks of any line. In such cases each line is expected to support the burden of its own disabilities. Such industries or business houses are at liberty to employ any railroad lines available, under equal rates by all, and local disabilities are usually offset by the corresponding advantages at other points. Propositions have very frequently been made for the relaxation of this rule, and the circumstances are often such as to cause one line or another to appeal strongly for relief. But relief of this nature cannot be authorized at one point alone. If such a course were to be adopted similar considerations must be given like force elsewhere, and the Commissioners believe that the true interests of all the Western lines lies in the maintenance of the principle that their service ends with the station house, side track or other usual place for the delivery of freight. Moreover, arrangements of the nature proposed have been held to be illegal by the Interstate Commerce Commission. The authorization of the payment of drayage to equalize distances between the depots of different lines has been frequently proposed in the various Associations west of Chicago and the Mississippi River, but as yet without success. The shrinkage of revenue required for this purpose would be considerable if the principle were once introduced; and however hard any given case may seem to be upon its peculiar facts, the Commissioners cannot feel justified in authorizing its adoption in any case.

The Southern Pacific recently applied to the Trans-Continental Association to place New Orleans on the Missouri River basis on all transcontinental traffic, the same as Lake Superior ports. The application was not approved and an appeal was taken to the Commissioners of the Western Traffic Association, who have now rendered a decision which, says in part:

The proposition cannot be determined upon distance alone. If the basis which exists at Duluth is unfair to other lines, or if it tends to inequality in the distribution of traffic, or extension of the same conditions to another gateway, would not tend to aggravate the difficulties, but would only serve to aggravate. The Commissioners do not feel warranted in entertaining a proposition to correct an alleged inequality by enlarging its scope, especially when there are several other members of the Trans-Continental Association operating on interior lines whose interests would be disastrously affected by the change proposed.

The statement of tonnage transported through Southwestern Missouri River gateways for the month of June has just been issued and shows the following per centage: Atchison, 26.5 per cent.; Alton, 7.9 per cent.; Burlington, 16.8 per cent.; St. Paul, 5.5 per cent.; Rock Island, 8.4 per cent.; Chicago-Great Western, 7.8 per cent.; K. C. F. S. & M., 5.6 per cent.; Wabash, 4.8 per cent.; Mo. Pacific, 10.7 per cent.; total, 100.

The suits against the Chicago ticket scalpers were dropped to-day in Judge Tutill's court. The Judge remarked during the hearing of a motion to quash the indictments on Monday last that he would be compelled to declare the law under which the defendants were indicted unconstitutional, and the prosecution decided to abandon the suits.

The Atchison, Topeka & Santa Fe has given notice of withdrawal from the Trans-Continental Association. This is the third line to take this action.

All the Eastern roads have decided to put in effect a round-trip rate of \$5 for the national convention of real-estate dealers, which will be held in Buffalo. The tickets will be sold only on Oct. 3 and good till Oct. 25. This was done to meet the Nickel Plate round-trip rate of \$7.50.

The shipments of eastbound freight, not including live stock, from Chicago by all the lines for the week ending Sept. 24 amounted to 63,001 tons, against 63,751 tons during the preceding week, a decrease of 750 tons, and against 57,894 tons during the corresponding week of 1891, an increase of 5,107 tons. The proportions carried by each road were:

Roads.	Wk to Sep. 24.		Wk to Sep. 17.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	9,962	15.8	10,569	16.6
Wabash.....	3,513	5.8	3,409	5.4
Lake Shore & Michigan South.....	3,718	14.8	2,989	15.7
Pitts., Ft. Wayne & Chicago.....	6,698	10.5	6,360	10.3
Pitts., Cin., Chicago & St. Louis.....	8,007	17.7	7,476	11.7
Baltimore & Ohio.....	3,263	5.2	3,813	6.
Chicago & Grand Trunk.....	4,391	7.	4,595	7.2
New York, Cin. & St. Louis.....	6,045	11	6,659	10.4
Chicago & Erie.....	5,397	14.1	8,419	13.2
C., C., C. & St. Louis.....	1,299	2.2	2,226	3.5
Total	63,001	100.0	63,751	100.0

Of the above shipments, 3,242 tons were flour, 23,480 tons grain and millstuff, 11,511 tons cured meats, 12,182 tons dressed beef, 1,538 tons butter, 2,488 tons hides, and 6,426 tons lumber. The three Vanderbilt lines carried 41.6 per cent., the two Pennsylvania lines 24.3 per cent. The lake lines carried 118,310 tons, against 130,422 tons during the preceding week, a decrease of 12,112 tons.

A New Kink in Demurrage.

Mr. E. F. Baker, Manager of the Detroit Car Service Association, has issued the following notice: Until further notice cars loading with bones, coal, coke, charcoal, glue stock and lumber will be allowed to remain three days on storage track without rental charge, in addition to 48 hours for unloading. Consignees receiving shipments of bones, coal, coke, charcoal, glue stock and lumber, to be reloaded to any yard or siding, may under the rules hold cars, without payment of rental, for the storage period of three days, but for all time in excess of that the original consignee shall pay \$1 per car per day or fraction thereof, so that 48 hours may remain to the party actually taking delivery in which to unload without payment of rental. Agents will decline to receive orders for the disposal of such shipments, until the rental is paid by the original consignee for all time taken for storage in excess of three days allowed by the rules. The delivering road shall have the privilege of storing such shipments on any of its sidings or at the point of delivery, be it public team track or private siding; but the consignee will be allowed 48 hours only after breaking bulk even if he elects to unload during the period allowed free for storage. Under this rule, when cars are stored on the delivery track, the report to the manager will show them as placed at the beginning of the fourth day or at the time bulk is broken, if within the storage limit. On transfer bills to connections for cars on which three or more days' storage have been taken by consignee, forwarding agents will note "48 hours remain for unloading."

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The best results are obtained in freight train braking from having all the cars in a train fitted with power brakes, but several years' experience has proven conclusively that brakes can be successfully and profitably used on freight trains where but a portion of the cars are so equipped. Below is a graphical illustration of the progress made in the application of the Automatic Brake to freight cars since its inception.

Year.	No. per year.	Grand tot.
1881	105	105
1882	1,085	1,190
1883	4,966	6,156
1884	15,051	21,207
1885	10,410	31,617
1886	8,946	40,563
1887	9,281	49,844
1888	27,696	77,540
1889	26,065	103,605
1890	50,502	154,107
1891	39,061	193,168

193,168 freight cars fitted with the Westinghouse Automatic Brake, which is nearly 20 per cent. of the Entire Freight Car Equipment of this country.

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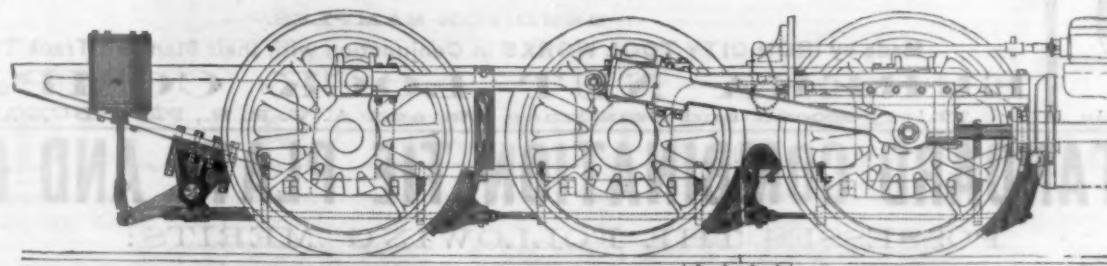
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The tie plate and brace is especially useful for curves and guard rails, and also on bridges, whether the rail is laid on ties or on stringers. A tie plate without a brace will not save the head of the spike. A brace without a tie plate will not save the tie, and in a short time the rail will wear into the tie.

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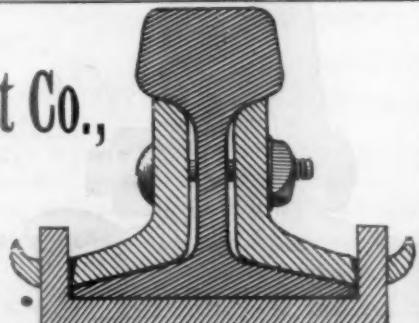
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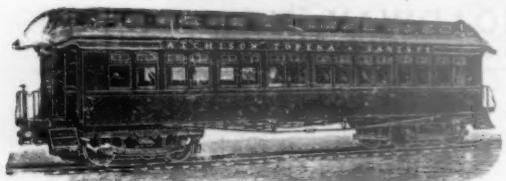
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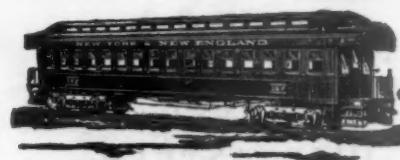
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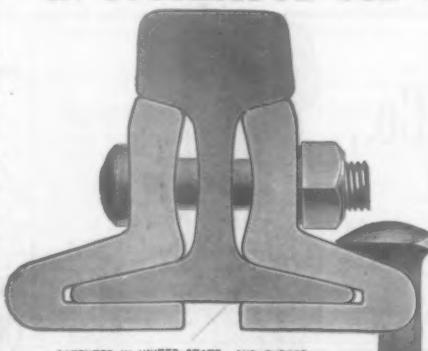
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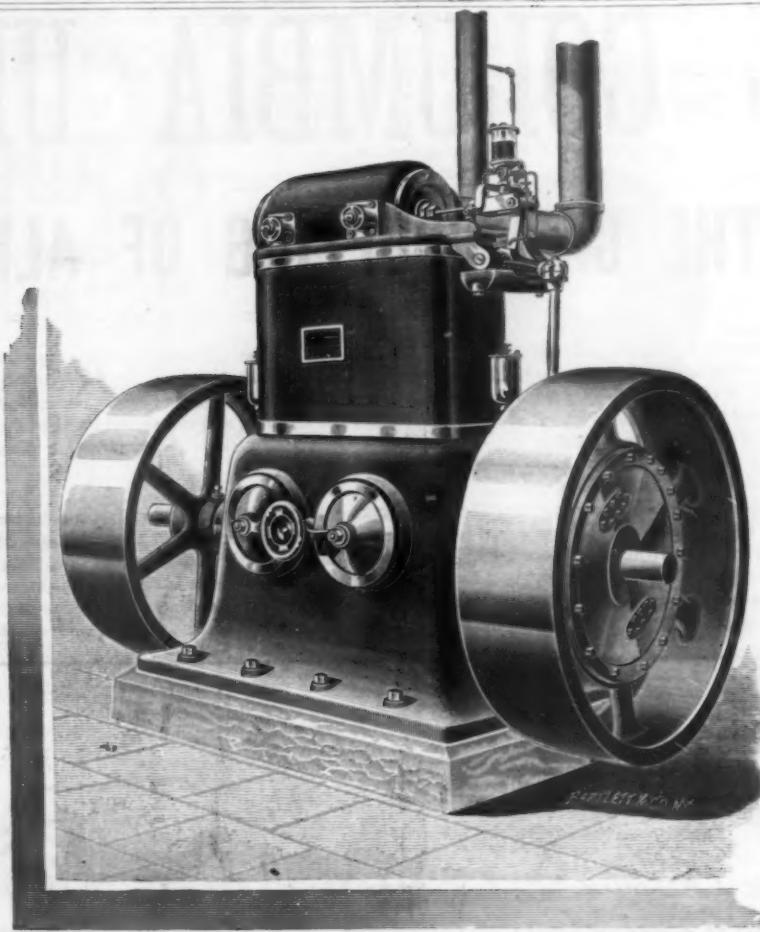
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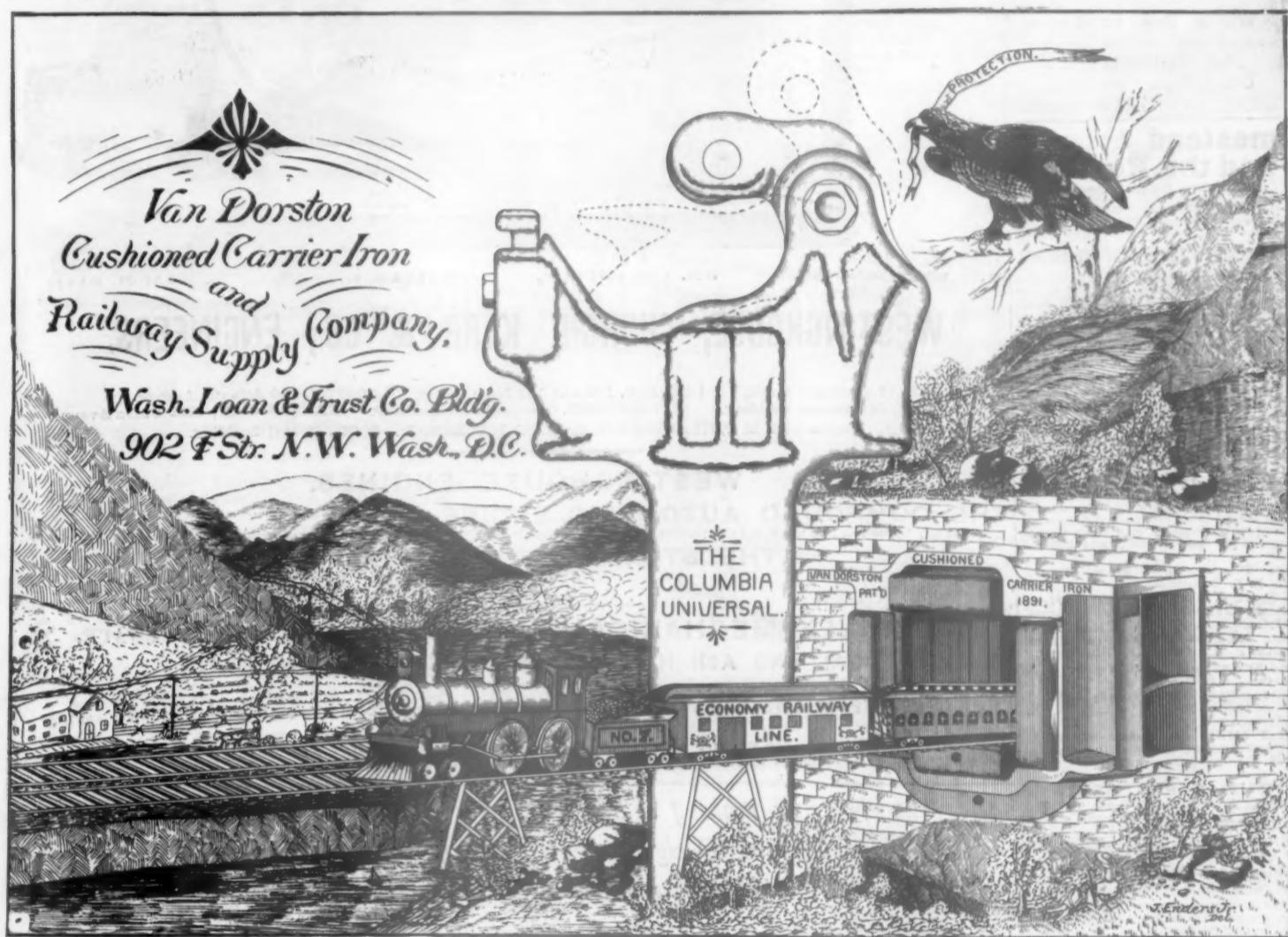
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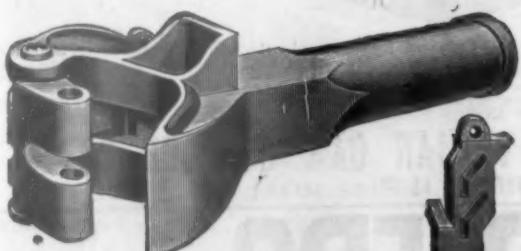


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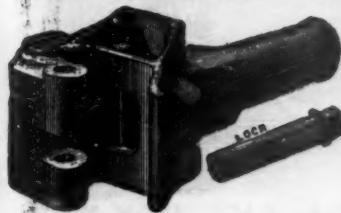
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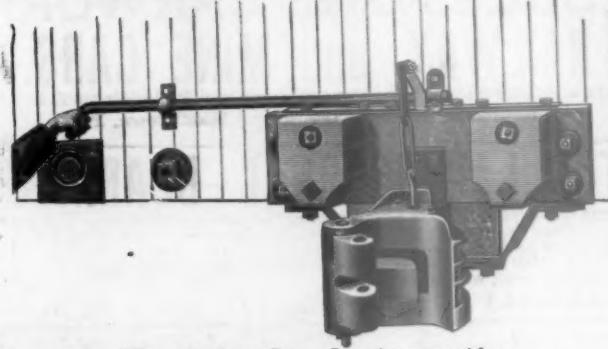
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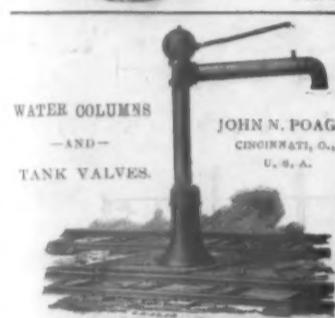
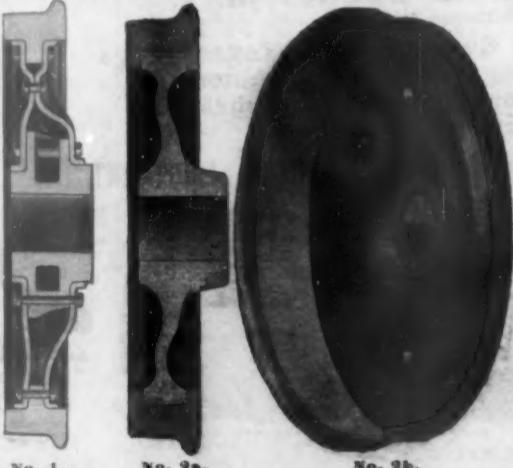
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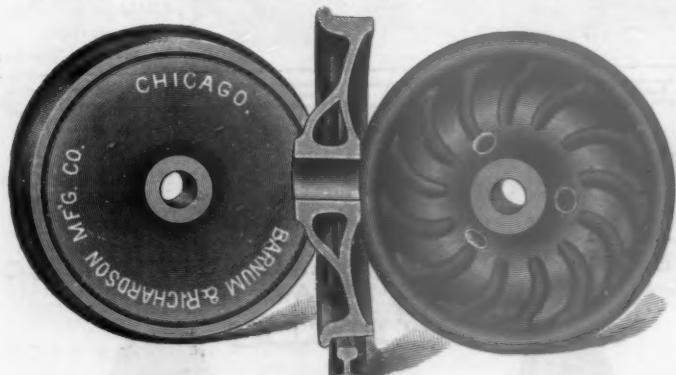
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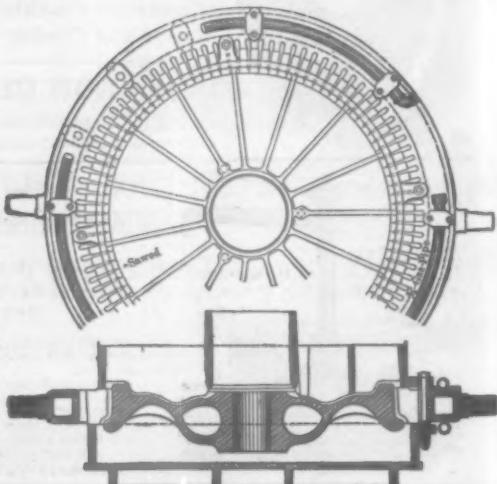
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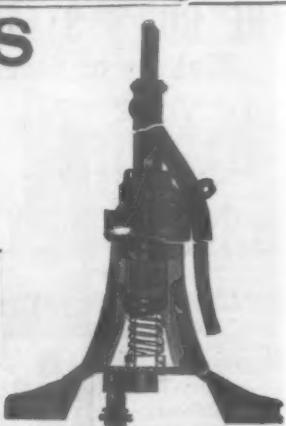
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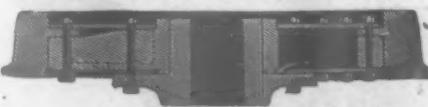
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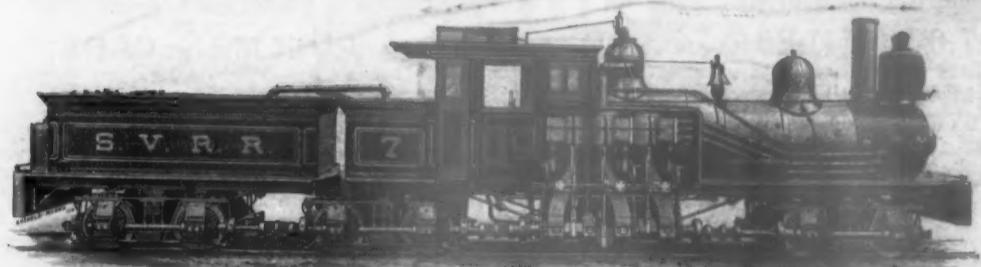
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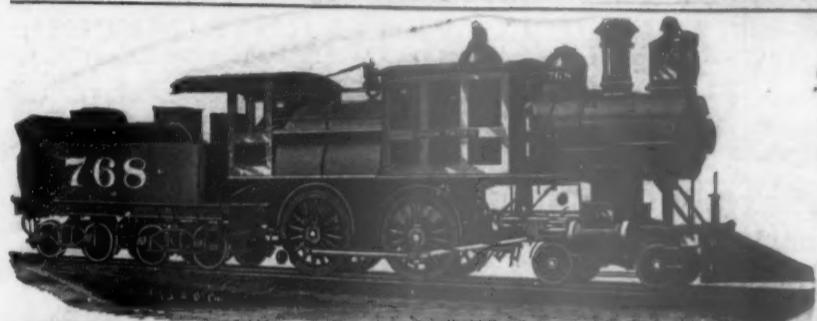


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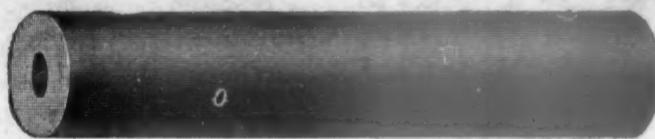
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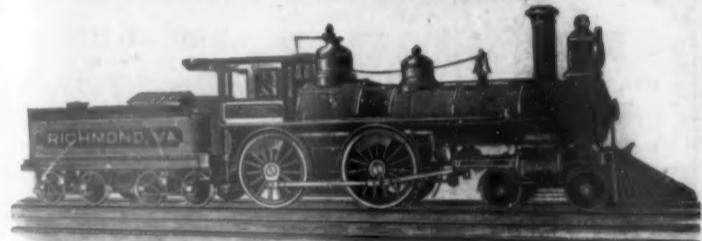
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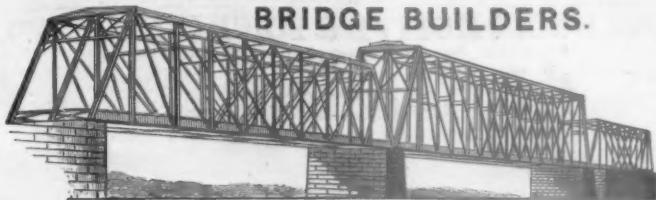
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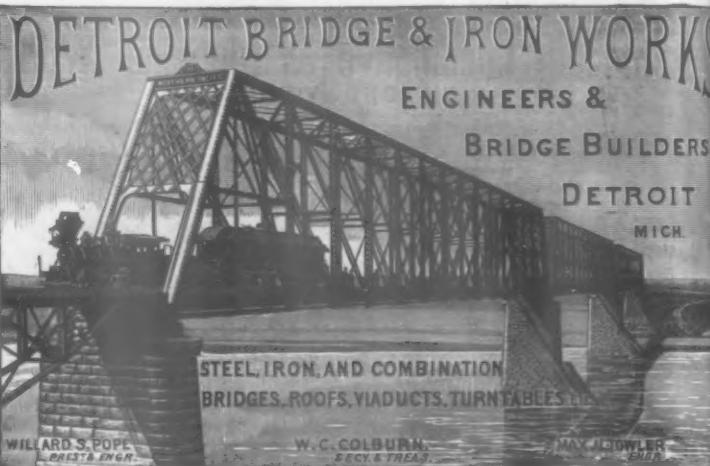
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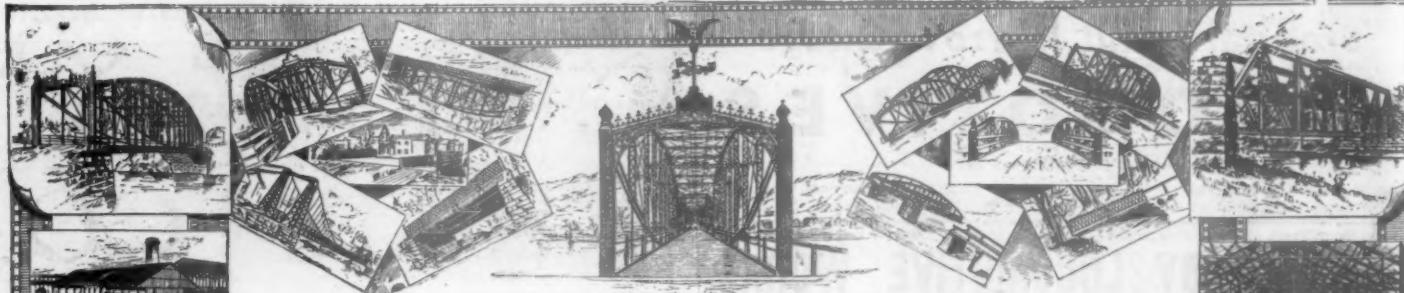
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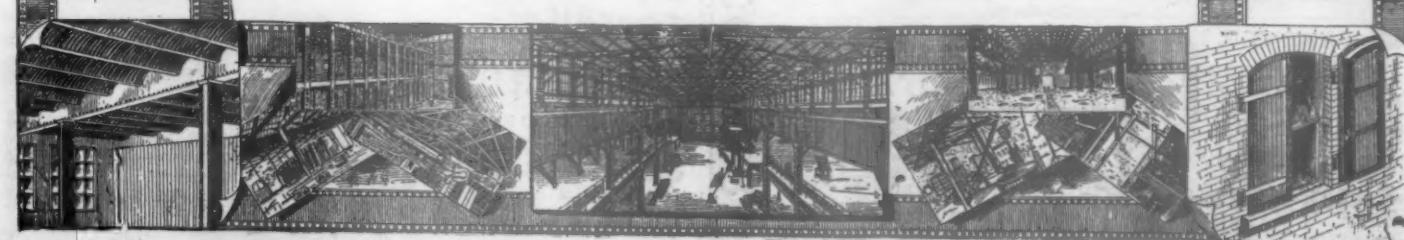
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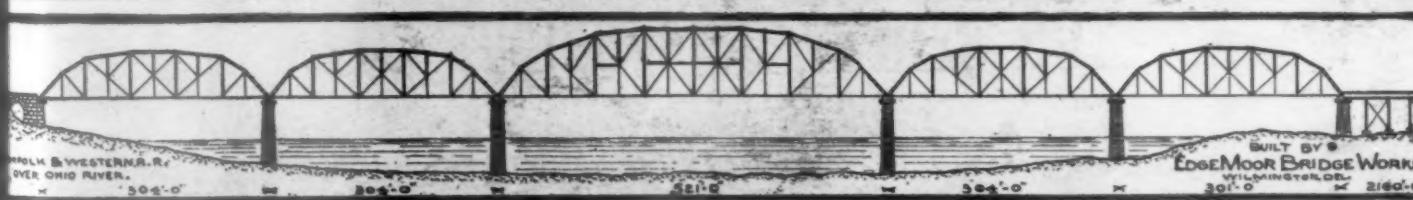
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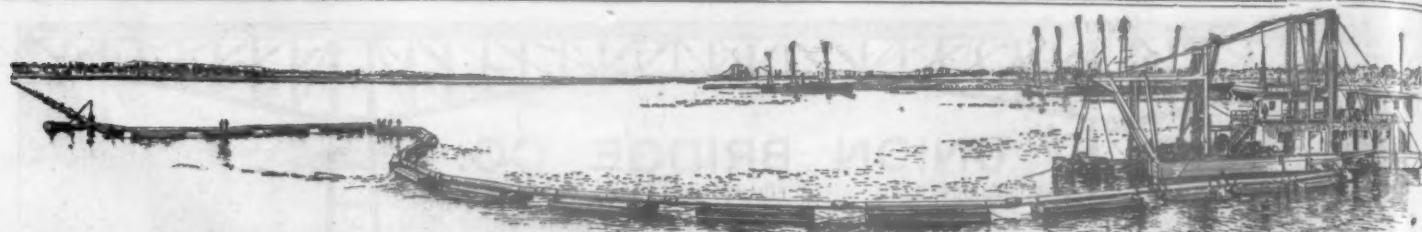
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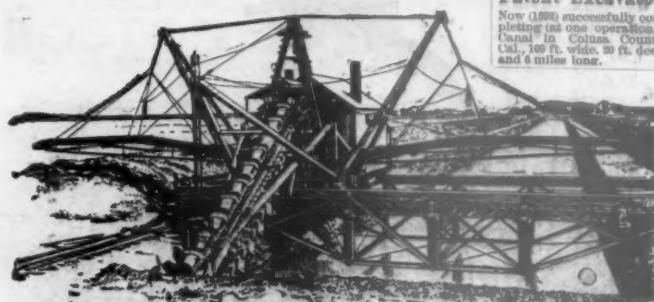
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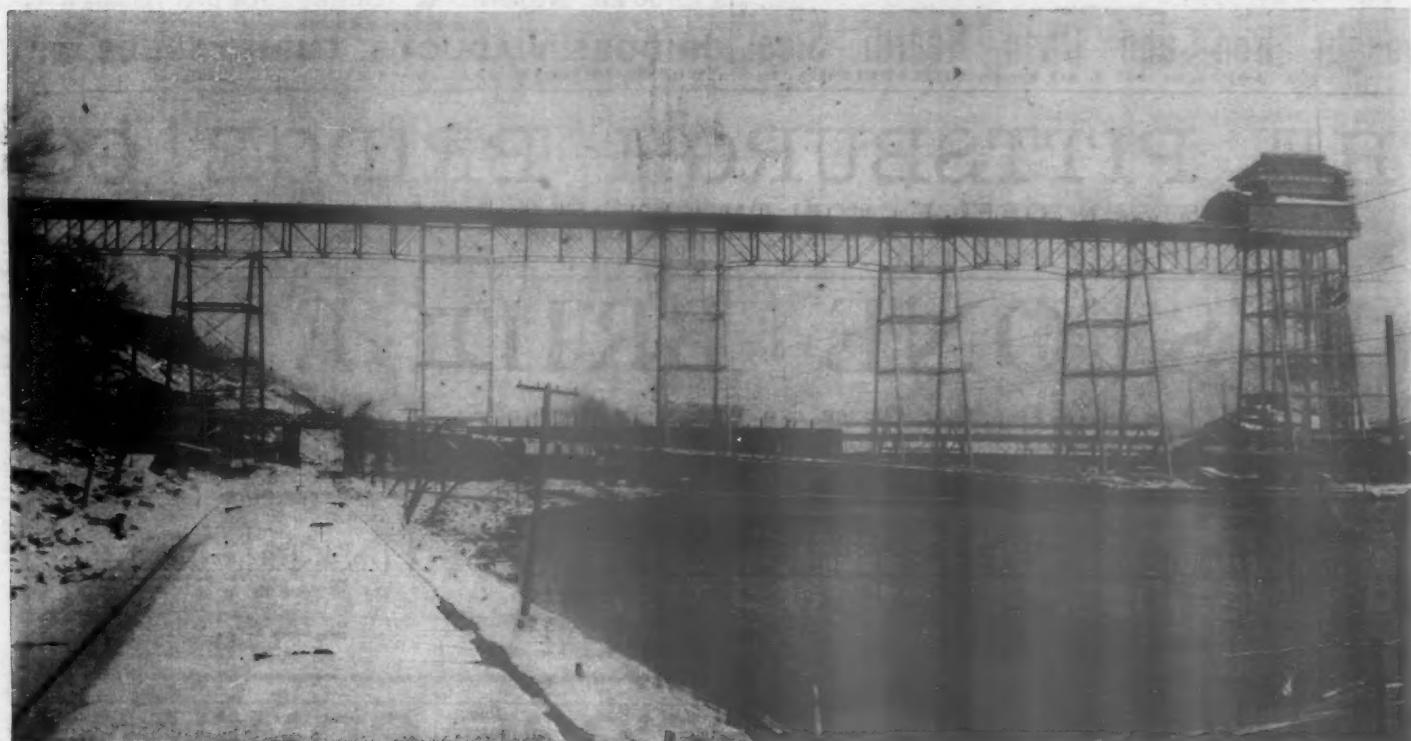
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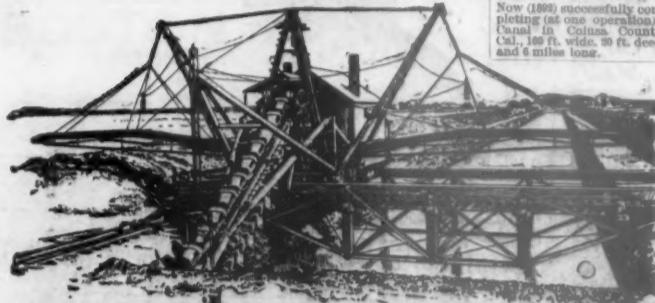
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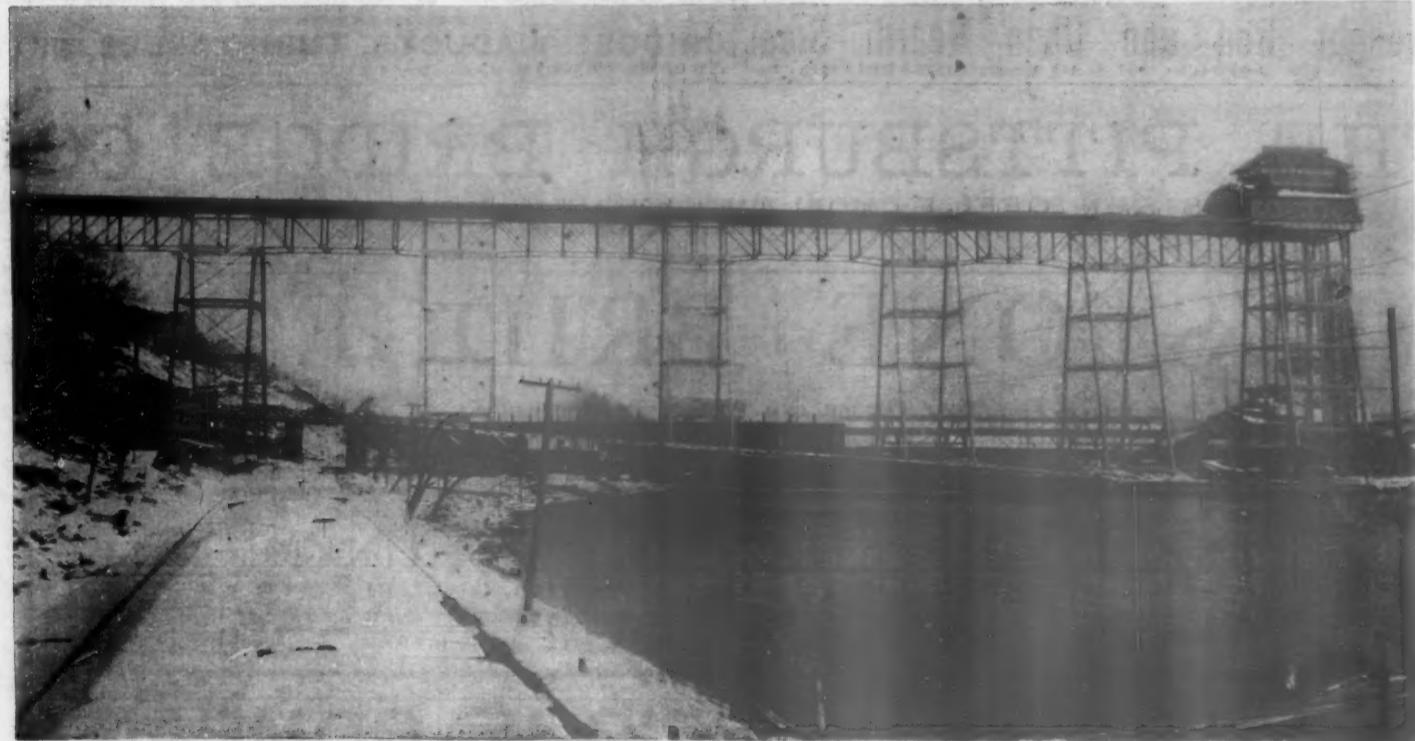
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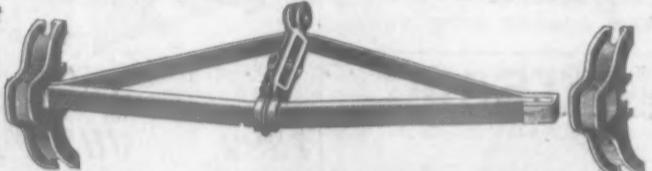
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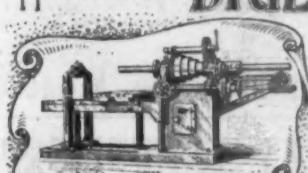
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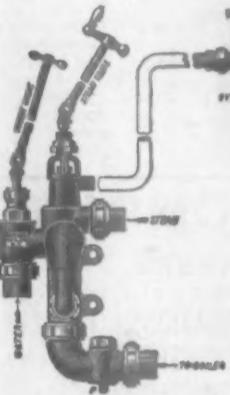
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